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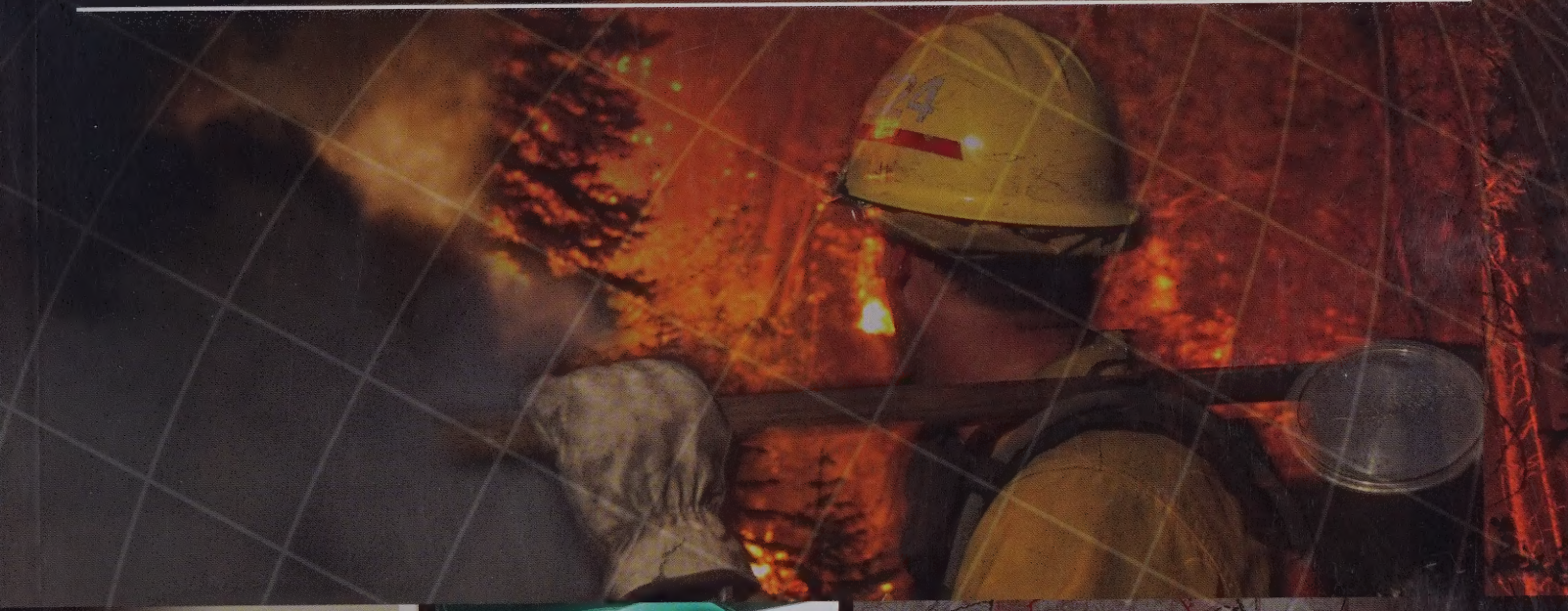
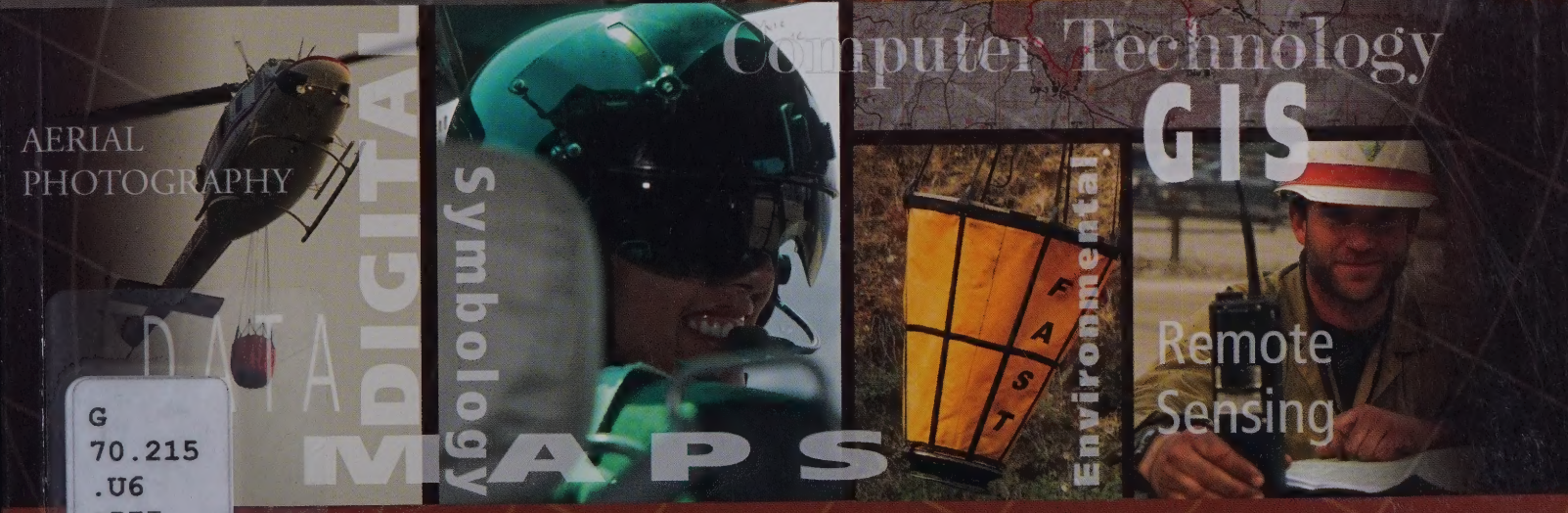
GIS

STANDARD OPERATING PROCEDURES ON INCIDENTS

PMS 936

September 2014





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GIS Standard Operating Procedures on Incidents

September 2014
PMS 936

Sponsored for NWCG publication by the NWCG Data Management Committee. Prepared and maintained by the Geospatial Subcommittee. Questions regarding the content of this product should be directed to Geospatial Subcommittee members and agency representatives at *http://www.nwcg.gov/branches/committees.htm*. Questions and comments may also be emailed to *BLM_FA_NWCG_Products@blm.gov*.

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Previous editions: 2006.

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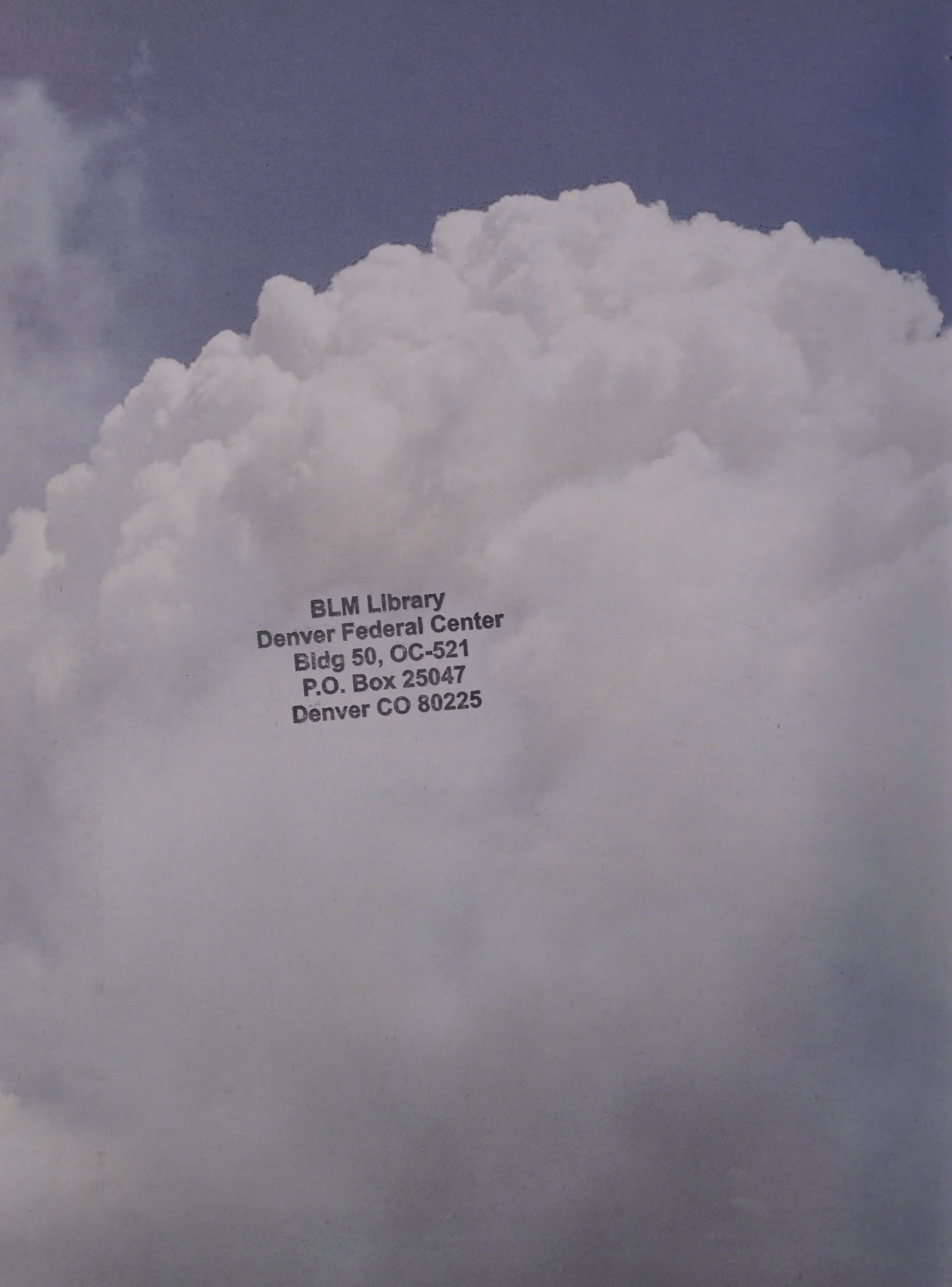
Editing, layout, and design were provided by the BLM National Operations Center, Denver, CO.
All photos were generously contributed by Photographer Kari Greer.



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Executive Summary

Standard operating procedures (SOPs) clarify the Geographic Information System (GIS) business needs and functional standards associated with supporting wildland fire incidents. The SOPs presented in this document are intended to help ensure consistency in the delivery of GIS products and services. They focus on the work performed by a GIS Specialist (GISS) to fulfill the GIS needs for the Planning Section of the Incident Management Team; however, they may be useful for all hazard incidents.

These SOPs were reviewed and updated 2012–13, from the 2006 publication, by the National Wildfire Coordinating Group (NWCG) GIS Standard Operating Procedures (GSTOP) on Incidents Revision Unit. Guidance was provided by the Information Technology Committee and the Geospatial Subcommittee. The covered SOPs pertain to GIS data management, map product development, incident GIS documentation and archiving, team transition, and general guidance for the GISS (and/or others who are performing the mapping function at the incident). Several chapters group key information onto pages designed for quick printing and use as stand-alone job aids. The SOPs also provide guidance for individuals with whom the GISS cooperates, such as Long Term Fire Analysts, Geographic Area Coordination Centers, and users of the National Interagency Fire Center's file transfer protocol site (*ftp://ftp.nifc.gov*).

In 2014, *Wildland Fire Incident Management Field Guide* (PMS 210) replaced the 2004 NWCG *Fireline Handbook* (PMS 410-1), which had displayed the primary map symbols for incident maps. The 2014 field guide (while displaying some symbols) notes that GSTOP is now the source for the most current map symbology. This symbology appears in Figure 5.1, Standard Point Map Symbols, Figure 5.2, Standard Line Map Symbols, and Figure 5.3, Standard Polygon/Fill Map Symbols.

The SOPs contained in this document apply to all NWCG participating agencies, with the understanding that in certain extenuating circumstances, full compliance with these standards may not be possible.

Introduction

In 2004 the Geographic Information System Standard Operating Procedures (GSTOP) on Incidents Project was chartered by the National Wildfire Coordinating Group (NWCG). Its primary objective was to create standard operating procedures (SOPs) for the Geographic Information System (GIS) function on wildland fire incidents, and these were published in a document entitled, *GIS Standard Operating Procedures on Incidents* 2006. That effort coincided with NWCG's formal acceptance of a newly developed "Geographic Information System Specialist (GISS)" Position Task Book and training. Since the completion and adoption of the original GSTOP publication in 2006, wildland fire management, policies, and associated technologies have changed considerably.[1] The NWCG Geospatial Subcommittee (GSC), recognizing the need for publication review and revision, conducted a field survey in 2011 and solicited review and change requests by the user community. The GSC asked the field to consider all aspects of geospatial technologies, processes, and data management, as well as current fire policy when submitting change requests and comments.

The GSTOP Revision Unit was formed and chartered under the direction of the GSC, under the authority of the NWCG. Unit membership comprises a wide representation of NWCG member agencies and geographic areas. Members are experts in the implementation of GSTOP, ArcGIS, and associated geospatial data, applications, tools, and processes. The GSTOP Revision Unit reviewed change suggestions, provided recommendations as subject matter experts, and edited the 2006 publication.

GSTOP 2014 updates the 2006 edition with SOPs currently taught in "S-341, GIS Specialist for Incident Management" and other NWCG-sanctioned geospatial training. GSTOP 2014 should be implemented on all wildland fire incidents. It standardizes GIS products and methods and is intended to improve service to decisionmakers, including Incident Management Teams (IMTs) and others who rely on this critical information. The primary audience for this document is the GISS performing GIS work on a wildland fire incident, other positions (e.g., other members of the Planning Section) who support the IMT and who use incident data and products, and personnel reliant on Planning Section products; for example, Public Information Officers and Operations Section personnel.

These SOPs address national interagency GIS information management issues and are intended to provide a technology-independent standard. While changes in technology may lead to different

[1] National Wildfire Coordinating Group, Memorandum, NWCG#001-2009, "Update on the Modifications to the Interagency Strategy for the Implementation of Federal Wildland Fire Management Policy" (January 7, 2009); Wildland Fire Leadership Council, Guidance for *Implementation of Federal Wildland Fire Management Policy* (February 2009).

implementation over time, the design parameters that represent business needs should remain constant. References to commonly used software may exist in some chapters (e.g., Chapter 2, File Naming and Directory Structure) to provide guidance for specific issues related to implementing GSTOP. Tools (e.g., job aids) for implementation of GSTOP using a variety of software, including web and mobile applications, may be found at *http://gis.nwcg.gov/gstop_symbol.html*.

The SOPs within this document have been specifically developed to:

- Provide people with the safety, health, environmental, and operational information necessary to perform a job properly
- Ensure that production operations are performed consistently
- Maintain quality control of processes and products
- Ensure that processes continue uninterrupted and are completed on an established schedule, especially during incident transition periods
- Serve as a training document for users about the process for which the SOP was written
- Serve as a historical record of the "how, why, and when" steps in an existing process, so there is a factual basis for modifying or updating those steps
- Ensure the future utility of data generated on wildland fire incidents

This document targets the GIS function on IMT Type 1 or IMT Type 2 wildland fire incidents. As the size or complexity of a wildland fire incident increases, the mapping demands often expand in order to portray adequately the information relevant to the protection of life, property, and resources. These SOPs are also appropriate to assist local resources (from the home unit or a nearby unit) in the use of GIS for IMT Type 3 wildland fire incidents, and the application of as many of them as possible is encouraged. Many key elements within this document will assist personnel if the incident expands in size and will help with archiving data for future needs.

SOPs have been developed for the following application areas:

1. GISS Minimum Expectations: describes the knowledge, skills, and abilities and the equipment needed for a GIS to function at a basic level on an incident, including a discussion of hardware, software, infrastructure needs, and incident procedures that the GISS must be able to follow.
2. File Naming and Directory Structure: provides guidance on establishing and maintaining an efficient and consistent file naming and directory structure for incident geospatial data, including common abbreviations.
3. Documentation and Metadata: provides procedures for the daily documentation of incident GIS data.

4. Minimum Essential Datasets: describes the minimum base datasets needed for incident mapping and analyses and how to obtain such data and evaluate them.
5. Map Symbology: provides standard map symbology guidance and examples for incident mapping.
6. Map Products: provides guidelines for the creation of the five primary map products that are the responsibility of the Situation Unit and that are produced by the GISS: Incident Action Plan (IAP) Map, Briefing Map, Situation Unit Map, Transportation Map, and Progression Map. These SOPs also include guidelines for other common map products produced on wildland fire incidents.
7. Data Sharing, Backup, and Archiving: provides data sharing, backup, and archiving procedures for GIS data developed on an incident, including sensitive data.
8. Team Transition: provides procedures for an effective and consistent method of transitioning from one GISS to another, and includes guidance on procedures, responsibilities, and communications.

Figures and pages designed for use as stand-alone job aids also capture key information. Additional aids include a list of acronyms and a glossary of terms used in the document; appendixes of sample documents; and a bibliography of cited documents and resources, including links to online versions.

Although the SOPs are applicable for many types of incidents, there are potential differences in GIS support for Burned Area Emergency Response (BAER) and all-hazard incidents[2] (particularly those managed by the Department of Homeland Security/Federal Emergency Management Agency[3]). The specifications for hardware, software, and skill set for GIS expertise for these incidents may be different from those needed for wildland fire incidents and may require a higher technical skill level in environmental modeling and image processing to support specific needs adequately.

These SOPs do not cover specific information about technology issues (i.e., hardware, software, and networking) and do not endorse or recommend any commercial hardware or software products.

These SOPs are subject to review and modification. See the change management page on the GSC website (*http://gis.nwcg.gov/gstop_changerequest.html*). Change requests will be evaluated annually. Such review is necessary to verify that the SOPs continue to meet the needs of the Incident Management Teams and the GISS in the field.

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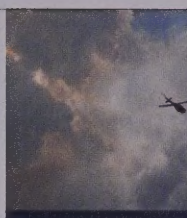
[2] National Wildfire Coordinating Group, Memorandum, NWCG#001-2012, "NWCG's Role in Support, Coordination, and All-Hazards Response by Wildland Fire Agencies" (January 10, 2012), including Attachment A, "NWCG All-Hazards Intent Document."

[3] National Wildfire Coordinating Group, Memorandum, NWCG#017-2011, "NWCG and FEMA National Integration Center (NIC): Collaboration and Coordination" (September 28, 2011).

Acronyms

ANSI	American National Standards Institute
API	Application Program Interface
ArcGIS	A suite of GIS software produced by Esri
ARCH	Architectural Series Map Size
BAER	Burned Area Emergency Response
BLM	Bureau of Land Management
CD	Compact Disk
CORS96	Continuous Operating Repeater System 1996
COTS	Commercial Off-the-Shelf
CSDGM	Content Standard for Digital Geospatial Metadata
CTSP	Computer Technical Specialist
DAFIF	Digital Aeronautical Flight Information File
DHCP	Dynamic Host Configuration Protocol
DOCL	Documentation Unit Leader
DOQQ	Digital Orthophoto Quarter Quadrangle
DP	Drop Point
DPRO	Display Processor
DRG	Digital Raster Graphic
DVD	Digital Video Disc
DVOF	Digital Vertical Obstruction File
EOC	Emergency Operations Center
FAA	Federal Aviation Administration
FARSITE	Fire area simulator
FBAN	Fire Behavior Analyst
FEMA	Federal Emergency Management Agency
FGDB	File Geodatabase
FGDC	Federal Geographic Data Committee
FIMT	Fire Incident Mapping Tool
FOB	Field Observer
FSPro	Fire Spread Probability
FTP	File Transfer Protocol
GACC	Geographic Area Coordination Center
GeoMAC	Geospatial Multi-Agency Coordination Group

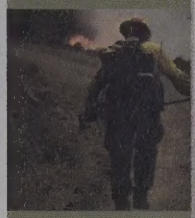
GIS	Geographic Information System
GISS	Geographic Information System Specialist
GNIS	Geographic Names Information System
GPS	Global Positioning System
GSAN	Geospatial Analyst
GSC	Geospatial Subcommittee of the NWCG
GSTOP	Geographic Information System Standard Operating Procedures
IAP	Incident Action Plan
ICP	Incident Command Post
ICS	Incident Command System
IMT	Incident Management Team
IP	Internet Protocol
IR	Infrared
IRIN	Infrared Interpreter
ISO	International Organization for Standardization
IT	Information Technology
LTAN	Long Term Fire Analyst
MAP	Management Action Point
MOA	Military Operations Area
MS-DOS	Microsoft Disk Operating System
MTR	Military Training Route
NAD83	North American Datum 1983
NAIP	National Agriculture Imagery Program
NFES	National Fire Equipment System
NICC	National Interagency Coordination Center
NIFC	National Interagency Fire Center
NIMS	National Incident Management System
NWCG	National Wildfire Coordinating Group
PLSS	Public Land Survey System
PMS	Product Management System
PSC	Planning Section Chief
PTB	Position Task Book
RAM	Random Access Memory
SITL	Situation Unit Leader
SOP	Standard Operating Procedure



SOPL	Strategic Operational Planner
STANDLSGD	Scale bar, Title, Author, North arrow, Date of preparation, Legend, Source, Graticule/grid, Datum
TB	Terabyte
TFR	Temporary Flight Restriction
UDF	Universal Disk Format
UPS	Uninterruptible Power Supply
UNC	Universal Naming Convention
UPS	Uninterruptible Power Supply
USB	Universal Serial Bus
USGS	United States Geological Survey
UTM	Universal Transverse Mercator
WFDSS	Wildland Fire Decision Support System
WGS84	World Geodetic System 1984
WUI	Wildland Urban Interface

File Formats

DOC	Microsoft Word document
DOCX	Microsoft Word 2007 (and later) document
EPS	Encapsulated Postscript
GDB	Geodatabase
GPX	GPS eXchange
HTML	Hypertext Markup Language
JPEG	Joint Photographic Experts Group
KML	Keyhole Markup Language
KMZ	Compressed Keyhole Markup Language File
LYR	Esri layer file
MXD	Multiple XML documents
PDF	Portable Document Format
SHP	Esri Shapefile
TXT	Text only
XLSX	Microsoft Excel 2007 (and later) document



Chapter 1

Purpose

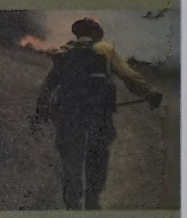
This chapter describes the knowledge, skills, and abilities and the equipment needed for a GIS Specialist (GISS) to function at a basic level on an incident. It also describes the procedures that a GISS must be able to follow and the field conditions within which the GISS must be able to work. The data required for a GISS to fulfill minimum expectations on an incident are described in Chapter 4, Minimum Essential Datasets.

GISS Knowledge, Skills, and Abilities

The "Geographic Information System Specialist (GISS)" Position Task Book (PTB) outlines specific tasks that a GISS must accomplish. *Wildland Fire Qualification System Guide* (PMS 310-1) recommends training, consistent with National Wildfire Coordinating Group (NWCG) specifications. Note: Some agencies or disciplines may require additional training or experience for deployments beyond NWCG specifications.

The GISS must be able to:

- Use the standard commercial off-the-shelf (COTS) Geographic Information System (GIS) software effectively
- Work with a variety of spatial data types (raster and vector), including various data types, such as geodatabases and shapefiles
- Understand Global Positioning System (GPS) data collection methods and be able to download, process, and incorporate the data
- Understand the use of various projections and datums that include geographic coordinates (latitude-longitude) and be able to re-project data in multiple formats
- Answer questions, such as number of acres burned, acres by ownership, or other questions requiring basic GIS analysis and geoprocessing skills
- Troubleshoot hardware and software problems sufficient to stay operational (e.g., perform basic software installs, ensure the license managers are functioning, install print drivers, or connect a plotter to a computer)
- Communicate effectively with people inside and outside the Situation Unit (e.g., GISS, Situation Unit Leaders (SITLs), Infrared Interpreters (IRINs), Field Observers (FOBs), Display Processors (DPROs), Long Term Fire Analysts (LTANs), Geospatial Analysts (GSANs), local hosting agency personnel, or cooperating agency personnel to:



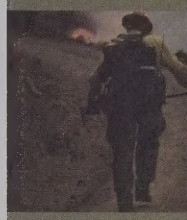
- explain technical issues or concerns
- train others in basic map reading
- exchange technical information

- Perform duties in "incident conditions," which may include:
  - long hours (12- to 16-hour operational periods, day and night)
  - close quarters shared with other personnel
  - stressful deadlines
  - travel (away from home base) for 14 days or longer
  - primitive fire camp conditions (sleeping on the ground, exposure to dust and smoke, and limited food choices)
  - diverse fire camp personnel, potentially including agency, contract, military, or prison crews

The GISS must know and/or understand the following:

- Basic Incident Command System (ICS) structure and procedures within the National Incident Management System (NIMS), as outlined in the self-study courses "Introduction to Incident Command System, ICS-100" (IS-100) or "National Incident Management System (NIMS): An Introduction" (IS-700): The GISS must have sufficient knowledge to operate within the chain of command on a wildland fire incident. For example:
  - knowledge of the organizational structure, and from whom to seek support or guidance on issues
  - familiarity with fire camp operations
  - understanding of the expectations of the assigned supervisor (typically the SITL)
- Work, rest, and other standards, as outlined in the 2014 manual of the National Interagency Fire Center, *Interagency Standards for Fire and Fire Aviation Operations:* The GISS must have sufficient knowledge to apply these standards appropriately.
- Firefighter and public safety is the first priority of the fire management organizations. "The commitment to and accountability for safety is a joint responsibility of all firefighters, managers, and administrators. Every supervisor, employee, and volunteer is responsible for following safe work practices and procedures, as well as identifying and reporting unsafe conditions."[4] Each GISS must demonstrate the maturity and judgment to:
  - keep firefighter and public safety in mind with respect to all products created and all data collected and maintained
  - recognize when there might be too much work and communicate to the assigned supervisor the need to prioritize, to adjust workloads, or to bring in additional staffing

[4]National Interagency Fire Center, *Interagency Standards for Fire and Fire Aviation Operations* (January 2014) (NFES 2724), Chap. 7, Safety and Risk Management, 07-1.



    - monitor one's own physical, emotional, and mental limits
    - follow safe work practices and procedures, and identify and report unsafe working conditions through the appropriate chain of command
- The complexity of the GIS demands on an incident is independent of the complexity level of the incident. It is possible to have a very complex GIS situation on a fire of minimal complexity.

Critical Equipment for GIS Operations

See *http://gis.nwcg.gov* for the most current information about required tools and software.

Hardware

- Desktop or laptop with DVD writer, USB ports, and sufficient RAM to run GIS software
- Appropriate output device (e.g., 11" x 17" printer with paper and inks, large-format (minimum 36" wide) plotter with sufficient paper and inks, projector)
- Appropriate connection cables, hubs, power supplies
- External portable hard drive

Software

- Standard, current versions of COTS GIS software installed and operational on the computer and capable of working with shapefiles
- Any required and appropriate licensing activated on the local machine for use on an incident
- Appropriate software extensions and tools, including installation media and install privileges/ passwords

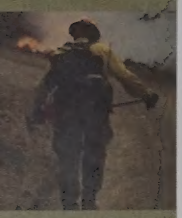
Infrastructure

- Internet connection, if available
- Power to the worksite
- Uninterruptible power supply (UPS) with battery backup and surge protection (recommended)

Media

- USB flash drives or memory sticks of adequate size to store incident data or plotter files
- Blank CDs or DVDs

Incident personnel who use their home unit electronic devices (e.g., cell phones, laptops, GPS receivers) are responsible for obtaining a resource order for documentation and must adhere to property management



procedures. Incident personnel are responsible for the care, use, and custody of property (government and private) and for promptly reporting lost or damaged property. The Incident Management Team (IMT) cannot authorize replacement of nonstandard cache items. The IMT provides documentation to the incident agency for review and determination. The incident agency may authorize, through written documentation to the home unit, replacement of government property items.[5]

Procedures

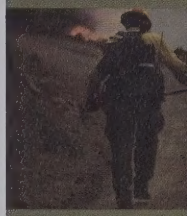
When dispatched, before arriving at an incident, the GISS follows the mobilization tasks in the GIS Specialist PTB. In addition, the GISS:

- If possible, contacts the SITL or a GISS currently assigned to the incident to inquire about hardware and software currently operating, any special needs or conditions, what data are already available, and any transition needs (media, timing, and others). The GISS should ask what peripheral devices are being used (e.g., printers/plotters), and check for driver and operating system compatibility.
- Recognizes what resources are lacking (e.g., plotter), and provides a solution to the need by, for example, obtaining permission and logistics for using the hardware and software network of a local unit. It may be necessary to rent a plotter or other equipment. The GISS uses the proper chain of command (SITL or Planning Section Chief (PSC)) and proper ordering processes that they have established.
- Tests Administrator privileges if bringing a laptop computer. Administrator rights are needed to install software and drivers and to create or connect to networks. Agency IT Specialists may require weeks/months' notice of that need to get those rights approved.

When setting up the GIS operations and running through the first operational period, the GISS follows incident check-in procedures:

- Conducts a briefing with the SITL to establish groundrules and expectations, as well as the planning timeline for map production
- Works with the SITL to establish an appropriate physical workspace
- Analyzes the data, hardware, personnel, and supplies available; if additional hardware, supplies, or personnel are needed for effective GIS productivity, the GISS follows incident ordering procedures, submits orders for supplies or additional resources through the supervisor (SITL) using the Incident Command System General Message Form, ICS 213 (*http://www.nwcg.gov/pms/forms/ics.htm*) and delivers the approved request to the Ordering Manager

[5] National Wildfire Coordinating Group, *Interagency Incident Business Management Handbook* (August 2012) (PMS 902) (NFES 2160), Chap. 30, Property Management, 30-2 and 30-3.

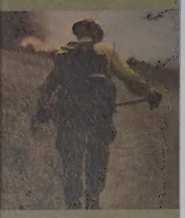


- Sets up network and shared drives and electronic workspaces, coordinating with the Computer Technical Specialist (CTSP)
- Sets up the file directory structure according to the standards described in Chapter 2, File Naming and Directory Structure
- Documents work for the Incident Command System Unit Log, ICS 214 (*http://www.nwcg.gov/pms/forms/ics.htm*) according to the guidelines described in Chapter 3, Documentation and Metadata
- Inserts base data into the directory structure
- Establishes the coordinate system and units that will be standard for the incident data
- Establishes outer extent of the incident's area of interest
- Gathers incident data; collects hardcopy maps already in use
- Generates map products according to guidelines for primary map products (see Chapter 6, Map Products) and the SITL's timelines and priorities

Responsibilities

The GISS must:

- Understand the chain of command, which may mean reporting directly to the SITL, PSC, or a lead GISS assigned to an IMT or other appropriate personnel
- Collect, process, and disseminate incident-related spatial data
- Maintain the standardized filing structures (see Chapter 2, File Naming and Directory Structure)
- Collect and maintain the minimum essential datasets (see Chapter 4, Minimum Essential Datasets)
- Create new data as needed for incident operations:
  - incorporating data from GPS receivers and other sources
  - digitizing fire perimeter and other incident data
- Create necessary products (see Chapter 6, Map Products) using the defined map symbology (see Chapter 5, Map Symbology) within the agreed upon time
- Provide standard (and other) maps as requested by the SITL
- Properly document data and archive work (see Chapter 3, Documentation and Metadata; see Chapter 7, Data Sharing, Backup, and Archiving)
- Comply with security data management agreement(s) (see Chapter 7, Data Sharing, Backup, and Archiving; see Chapter 8, Team Transition)
- Confirm which products are approved for sharing (either on the incident or publicly) by contacting the supervisor or designated personnel within the chain of command
- Effectively transfer the approved products, projects, and data created in GIS to other personnel on the incident and/or to the hosting unit (see Chapter 8, Team Transition)



- Transfer GIS data to and from various locations (through map services, FTP sites, or websites) as requested by the SITL (see Chapter 7, Data Sharing, Backup, and Archiving)
- Keep the SITL (or supervisor) informed of any known hardware, software, or data difficulties and concerns
- Comply with demobilization procedures

With regard to the GISS, the SITL:

- Directs and prioritizes all tasks within the Situation Unit including the GIS functions, and makes assignments that allow for individual strengths
- Coordinates and prioritizes incoming requests from Public Information Officers, cooperators, and others
- Requests map products
- Monitors the workload of the unit in compliance with the work and rest standards outlined in *Interagency Standards for Fire and Fire Aviation Operations*
- Authorizes the distribution of data or products related to the incident
- Orders the necessary equipment or people to accomplish the GIS work most effectively (computer support, power, equipment)

Other personnel collecting geospatial data on the incident are responsible for the following:

- Knowing how to use GPS receivers, and providing GPS download cables to the GISS
- Knowing the coordinate system format and datum in use for the incident for reporting and communicating geographic locations
- When providing spatial data files, adhering to file naming standards in Chapter 2, File Naming and Directory Structure, to allow for easy integration of files into the standard directory structure

Communications

The GISS must share information with the Situation Unit and all affected agencies and organizations in a timely and effective manner. When communicating with incident personnel and technical staff from outside the incident, it is imperative that the GISS maintain a professional demeanor. When communicating within the incident, the GISS must follow the ICS chain of command at all times. Incident communications, such as requests for materials, maps, or information, are tracked using the Incident Command System General Message Form, ICS 213 (*http://www.nwcg.gov/pms/forms/ics.htm*) or an alternate incident/team-created form approved by the SITL, such as a Map Request Form (see Appendix A for an example).

Whenever there is more than one GISS on an incident, one may be designated as the "lead" to coordinate and communicate with the SITL. Some IMTs have a GISS as part of the team; this individual may be designated as the "GIS Lead" by the SITL.

Chapter 2

Purpose

This chapter describes standardized file naming and directory structure for GIS data and related documents created and used on incidents managed under the Incident Command System. The guidelines presented here support consistent file naming and a directory structure that is clear and repeatable, that promotes efficient use and storage of GIS data, and that ensures a smooth transition between GIS Specialists by making it easy to locate data or products. This structure may be used both by incident GIS Specialists and by GIS professionals at the home unit of the incident. The intention is to allow some scalability for variation of incident situation, such as in number of GISS personnel, hardware use/availability, software used, available data, and even physical location, while still meeting the business needs of those with whom the GISS cooperates, such as Long Term Fire Analysts (LTANs), Geographic Area Coordination Centers (GACCs), and users of the National Interagency Fire Center (NIFC) FTP site (*ftp://ftp.nifc.gov*).

Specifications

GSTOP filing naming and directory structure is designed to serve as metadata; the file and folder names include incident-specific identification information, and the order of those metadata elements facilitates archival and use by the hosting agency, GACCs, etc. File names for specific layers include descriptive data about the incident. See Figure 2.1, Required File Name Elements; Figure 2.2, File Name Elements (quick reference); and Figure 2.3, File Names (examples).

Quick Tip: The spreadsheet 2014_GSTOP_File_Namer.xlsx at *http://gis.nwcg.gov/gstop_symbol.html* automatically creates text, including date and time, for the various files created on an incident! Enter the key incident information and product type and then copy the resulting names.

File names must be complete and stand on their own outside of the file structure; file names must be concise, use clear text, and avoid ambiguous terms. The general format for file naming is: {date and time}_{incident information}_{other information}; however, map documents (.mxd) and exported map products (e.g., .shp, .jpg, .pdf) begin with map type, size, and orientation.

- File names are limited by the Windows operating system and cannot be longer than 255 characters. Note: Some software may not allow backup onto CD or DVD for long folder and file names (more than 128 characters for path name and file name).

- File and folder names must not contain spaces, special characters, or periods, aside from file extension delimiters.
- The underscore "_" is the only allowable character for delimiting name elements.
- Feature classes within a file geodatabase must start with "i_" for incident.
- Capital letters may be used to make names easier to understand.
- The format for dates is 8 digits in year, month, day order (yyyymmdd).
- The format for time is 4 digits in a 24-hour format (hhmm).

The incident directory structure may be stored in any location. See Figure 2.4, Incident Directory Structure, for a description of the standard directories; Figure 2.5, Incident Directory Catalog Template (example), for a graphical example of the standard directory structure template; Figure 2.6, Incident Directory Catalog and File Names (example), for a graphical example of the standard directory structure containing files named according to the file naming standard; and Figure 2.7, Common Abbreviations Used in File Names, for a list of standard abbreviations. Note: According to agency needs, files for multiple incidents may be stored under an optional root folder named: \[yyyy]_incidents.

Procedures

Method of Work

Sound methods of work for a GISS, whether working alone or with a group, will save time, reduce errors, produce more consistent products, and will make the task of archiving and documentation easier. Establishing good methods of work at the start of an incident according to GSTOP file naming and directory structure standards will avoid many wasted hours later in the incident. A GISS should avoid the temptation to rush file management to make something "quick and dirty." The time for cleanup of poorly named files and folders almost never happens. Staying organized and encouraging others to work the same way will reduce tensions and avoid potentially serious problems.

Organization

- Copy a blank directory template, and change the incident name.
- Name the first map document (e.g., .mxd) according to GSTOP naming conventions and save to the projects folder. Typically, this is the master map document of the Incident Action Plan (IAP). Other master map documents can easily be created according to the GSTOP naming convention by using the "Save As" tool in ArcMap.

- Create and name the master incident geodatabase file(s) according to GSTOP naming conventions.
- Use the "Save a Copy" tool in ArcMap to save backup copies of the master map documents in the \projects\backups folder each operational period or as necessary. ("Save a Copy" rather than "Save As" allows the user to make a backup copy and continue to work in the master map document.) The previous backup files can be used as a pattern for the name by clicking on the file and then changing the date and time.
- Base the name of the map product files (exported from the ArcMap.mxd) on the map document (.mxd) name. Complete the names by inserting the appropriate date and time.
- Make a backup copy of the master incident geodatabase in the \incident_data\backups folder each operational period or as necessary.
- A file naming spreadsheet, 2014_GSTOP_File_Namer.xlsx, is available at *http://gis.nwcg.gov/gstop_symbol.html*. The tool automatically creates text, including date and time, for the various files created on an incident. To use the tool, enter the key incident information and product type, and then copy the resulting name from the spreadsheet to the save file dialog box in ArcGIS and other software.

Working with File Geodatabases

- A file geodatabase (FGDB) is a public API spatial data format published by Esri. An FGDB can contain vector and raster data, annotation, tables, and other types of data. The master incident geodatabase, often an FGDB, contains the primary geospatial database with incident feature classes, such as the fire perimeter, fireline, and drop points. When an FGDB is used on an incident, the file naming standard should be applied to the FGDB itself.
- Strongly recommended: Use an FGDB (.gdb) instead of personal geodatabases (e.g., .mdb), given the stability of an FGDB and its ability to handle larger amounts of data.
- Name feature classes within an FGDB with a leading "i_" (before creation date), because FGDB feature classes cannot begin with a number.
- Feature classes created and managed by the Fire Incident Management Tool (FIMT) have names such as FirePolygon, which cannot be edited to meet the standard. FIMT exports shapefiles from the master incident geodatabase that are automatically named following the standard. Standard file naming must be accomplished manually for other file types.
- When the master incident geodatabase is created and maintained by FIMT, the best practice is to create a second FGDB for feature classes not created and maintained using FIMT. This other incident geodatabase could include other incident-specific feature classes, such as temporary flight restrictions (TFRs), multi-page index, evacuation routes, annotation, and management action points (MAPs). This FGDB is stored in the root of the \incident_data folder. See Figure 2.4, Incident Directory Structure.

Capitalization Guidelines

- First letter of proper names (e.g., Jones)
- First letter to delimit multiple words (e.g., ClearCreek, IntenseHeat) (often called "CamelCase")
- All letters that stand for something (e.g., GPS)

Incident Identification

Both the Unit ID and Local Incident ID follow existing NWCG data standards. This file naming element combines a 2-letter state or country abbreviation, 3- or 4-character Unit Identifier (ID), plus 2- to 10-character (letters or numbers) Local Incident Identifier (ID) assigned by the local unit.

File Types

The sequence of specific elements to be placed in the file name is documented by the order of bulleted points in Figure 2.1, Required File Name Elements, and is reflected in Figure 2.2, File Name Elements (quick reference). Separate each element with an underscore; no other special characters or spaces are allowed in the file name.

Master Map Documents (e.g., .mxd) and **Master Incident Geodatabase(s):** (e.g., .gdb) These are the working files used for creating and editing the current incident map documents and data.

Master Map Documents: (e.g., .mxd) are created for each map product and are the working files for creating and updating maps for each operational period. Store these files in the root of the \projects folder. Do not include the date and time in master files; include only the year where the date and time would normally be placed. The year serves as a placeholder. Include date and time when saving backups of these files. Make backups for master files in the \projects\backups folder each operational period or when deemed necessary as protection against the master files becoming corrupted.

Master Incident Geodatabase: (e.g., .gdb) is the primary geospatial database containing incident feature classes symbolized according to NWCG standards, often referred to as "ICS data." Store this file in the root of the \incident_data folder. As with the master map document files, the file names contain only the year, and the files are backed up each operational period or when deemed necessary to protect against file corruption.

Quick Tip: Feature class names in a file geodatabase cannot begin with a number. To follow the GSTOP naming convention (date as first metadata element) for feature classes in a file geodatabase, name them with a preceding "i_" (for incident).

Other Incident Geodatabase: (e.g., .gdb) This is the geospatial database that contains incident-specific feature classes not created and maintained in the master incident geodatabase. Store this file in the root of the \incident_data folder. As with the master incident geodatabase, the file names contain only the year, and the files are backed up each operational period or when deemed necessary to protect against file corruption.

Store any additional geodatabases (e.g., a rehab/repair .gdb) in the root of the \incident_data folder. Additional working subfolders—gps, ir, modified base data, and progression—allow multiple individuals to work on various aspects of incident GIS support without causing permissions or software conflicts.

Export Files: (e.g., .shp, .shx, .dbf, .kml) These are stored in the \incident_data\exports folder, the location for sharing via FTP or other means.

Responsibilities

The GISS communicates the file naming and directory structure used on an incident to other GIS Specialists, including the hosting unit GIS staff and regional GIS staff. On an incident, the SITL (or, in the absence of a SITL, the Planning Section Chief or Type 3 or Type 4 Incident Commander) ensures that individuals working in the Situation Unit follow NWCG standards, including GSTOP file naming and directory structure conventions. NWCG standards represent a national interagency standard and should not be overridden at the incident level.

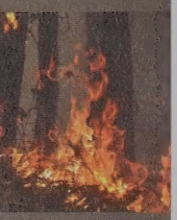


Figure 2.1 Required File Name Elements

Master map documents (e.g., .mxd)

- Map type (the standard map product description abbreviation)
- Page size (in inches or ANSI size, A–E)
- Page orientation (landscape or portrait)
- Year (yyyy) (year the incident started)
- Incident name
- Unit ID + Local Incident ID
- Optional: Tool or software version used to produce data (if created by a tool)

Map document backup files (e.g., .mxd)

Store these files in the \projects\backups folder.

- Map type
- Page size
- Page orientation (landscape or portrait)
- Date, including year (yyyymmdd) (the date the file was saved)
- Time the file was saved (hhmm 24-hour clock)
- Incident name
- Unit ID + Local Incident ID
- Optional: Tool or software version used to produce data (if created by a tool)

Master incident geodatabase (often an FIMT-created FGDB, e.g., .gdb)

- Year (yyyy) of the incident
- Incident name
- Unit ID + Local Incident ID
- Tool and version used to produce data (if created by a tool)

Incident geospatial data backup files (often an FGDB, e.g., .gdb)

Store these files in the \incident_data\backups folder.

- Date, including year (yyyymmdd) (the date the file was backed up)
- Time the file was saved (hhmm 24-hour clock)
- Incident name
- Unit ID + Local Incident ID
- Tool and version used to produce data (if created by a tool)

Figure 2.1 Required File Name Elements (continued)

Other incident data geodatabase (often an FGDB, e.g., .gdb)

- Year (yyyy) of the incident
- Incident name
- Unit ID + Local Incident ID
- The text, "Other_Incident_Data"
- Software version used to produce data

Incident data feature classes within a geodatabase (not created or maintained with FIMT)

- Prefix "i_" (to denote incident-specific feature)
- Date, including year (yyyymmdd) (the date the data were collected)
- Time of data collection (hhmm 24-hour clock)
- Incident name
- Unit ID + Local Incident ID
- Incident data type (the type of data portrayed by the data layer)
- The text, "TFR" + TFR size (only applies to TFR feature classes)
- Feature type (line, point, polygon)
- Number of pages + size of pages + page orientation (only applies to multi-page index feature classes)
- Coordinate system and datum

Incident export files or non-geodatabase geospatial data (shapefile (.shp), layer file (.lyr), exchange format, .kml, .kmz, or other compressed file)

- Date, including year (yyyymmdd) (the date the data were collected)
- Time of data collection (hhmm 24-hour clock)
- Incident name
- Unit ID + Local Incident ID
- Incident data type (the type of data portrayed by the data layer)
- Feature type (line, point, polygon)
- Coordinate system and datum

GPS data files (GPS exchange file (.gpx), text file (.txt), shapefile (.shp), or other data type)
Store in the \incident_data\gps folder.

- Date, including year (yyyymmdd) (the date the data were collected)
- Time of data collection (hhmm 24-hour clock)
- Incident name

Figure 2.1 Required File Name Elements (continued)

- Unit ID + Local Incident ID
- GPS feature type (GPS_pnt, GPS_lin, GPS_pol, GPS_feat (.gpx exchange files contain both waypoint and track features)
- Data source (the ICS position and/or name of person who collected the data)

Map product files (any map produced) (.pdf, .jpg, .eps). Store in \products\{date} (intended date of use) folder.

- Map type
- Page size
- Page orientation (landscape or portrait)
- Date, including year (yyyymmdd) (the date the map was produced)
- Time the map was produced (hhmm 24-hour clock, for infrared (IR) products this is the time of collection)
- Incident name
- Unit ID + Local Incident ID
- Operational period for which the map was produced, if appropriate (mmdd + day or night; the last product produced is labeled "final")
- Optional: dpi value

Multi-page map product files (.pdf, .jpg, .eps). Store in \products\{date} (intended date of use) folder.

- Map type
- Page size
- Page orientation (landscape or portrait)
- "MP" + page number
- Date, including year (yyyymmdd) (the date the map was produced)
- Time the map was produced (hhmm 24-hour clock, for IR products this is the time of collection)
- Incident name
- Unit ID + Local Incident ID
- Operational period for which the map was produced, if appropriate (mmdd + day or night; the last product produced is labeled "final")
- Optional: dpi value

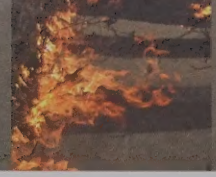
Figure 2.1 Required File Name Elements (continued)

Other supporting documents, spreadsheets, and other nongeospatial files (e.g., .xlsx, .docx)

Store in the \documents folder.

- Date, including year (yyyymmdd)
- Time, if appropriate (hhmm 24-hour clock)
- Incident name
- Unit ID + Local Incident ID
- Document contents

File Naming and Directory Structure



Master map document files
{map type}_{page size}_{page orientation}_{year}_{incident name}_{Unit ID+ Local Incident ID}.mxd
Optional: *{tool or software version}*

Map document backup files
{map type}_{page size}_{page orientation}_{date}_{time}_ {incident name}_{Unit ID+ Local Incident ID}.mxd
Optional: *{tool or software version}*

Master Incident geodatabase
{year}_{incident name}_{Unit ID+ Local Incident ID}_{tool & version used to produce data}.gdb

Incident geospatial data backup files
{date}_{time}_ {incident name}_{Unit ID+ Local Incident ID}_{tool & version used to produce data}.gdb

Other Incident Data geodatabase (may be needed when FIMT created/maintains data in the Master Incident geodatabase)
{year}_{incident name}_{Unit ID+ Local Incident ID}_Other_Incident_Data_{software and version}.gdb

Incident geodatabase feature classes (non-FIMT created/managed)*
i_{date}_{time}_{incident name}_{Unit ID+ Local Incident ID}_{feature type}_{coordinate system & datum}

TFR feature classes within the Other Incident Data geodatabase*
i_{date}_{time}_{incident name}_{Unit ID+ Local Incident ID}_tfr_{tfr size}_{ feature type}_{coordinate system & datum}

Multi-Page index features within the Other Incident Data geodatabase*
i_{date}_{time}_{incident name}_{Unit ID+ Local Incident ID}_{feature type}_{number of pages}_{size of pages}_{page orientation}_ {coordinate system & datum}

***Incident or export files* or run -geodatabase geospatial data**
{date}_{time}_ {incident name}_{Unit ID+ Local Incident ID}_{data type}_{feature type}_{coordinate system & datum}.shp or .zip, .kml, .kmz, .lyr

GPS data files
{date}_{time}_ {incident name}_{Unit ID+ Local Incident ID}_{GPS feature type}_{data source}_{coordinate system & datum}.shp or .glx, .txt

Map product files
{map type}_{page size}_{page orientation}_{date}_{time}_ {incident name}_{Unit ID+ Local Incident ID}_{Operational period if appropriate}.pdf or .jpg, .eps
Optional: *{dpi value}*

Multi-Page Map product files
{map type }_{page size}_{page orientation}_MP{page number}_{date}_{time}_ {incident name}_{Unit ID+ Local Incident ID}_{Operational period}.pdf

Other Supporting Documents , spreadsheets, and other non geospatial files
{date}_{time}_ {incident name}_{Unit ID+ Local Incident ID}_{document contents}.docx or *.xlsx*

All files
Optional: *{additional information}* added at end of name

***Feature class names in a file geodatabase may not start with a number, so a leading "i" (for incident) before the date is nesessary.**

Figure 2.2 File Name Elements (quick reference)

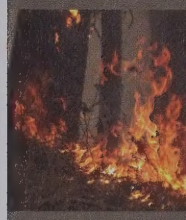


Figure 2.3 File Names (examples)

Example from Playa Incident, May 2011:

Master map document files:

iap_11x17_land_2011_Playa_AZHVR503_FIMT100011.mxd

brief_ansi_e_land_2011_Playa_AZHVR503.mxd

Map document backup files:

iap_11x17_land_20110516_2120_Playa_AZHVR503_FIMT100011.mxd

brief_ansi_e_land_20110515_1530_Playa_AZHVR503.mxd

Master incident geodatabase:

2011_Playa_AZHVR503_fimt100011.gdb

Incident geospatial data backup files:

20110515_0830_Playa_AZHVR503_fimt100011.gdb

20110516_2230_Playa_AZHVR503_fimt100011.gdb

Other incident data geodatabase: (non-FIMT created and maintained)

2011_Playa_AZHVR503_Other_Incident_Data_Arc10.gdb

Incident data feature classes within a geodatabase: (non-FIMT created and maintained)

i_20110514_0800_Playa_AZHVR503_tfr_5nm_pol_u11nad83

i_20110514_0930_Playa_AZHVR503_MP_Grid_Index_4_pg_letter_port_pol_u11nad83

i_20110516_1720_Playa_AZHVR503_MP_Grid_Index_6_pg_11x17_land_pol_u11nad83

Incident export files or non-geodatabase geospatial data:

20110515_0940_Playa_AZHVR503_ics_flin_u11nad83.shp

20110516_2230_Playa_AZHVR503_ics_pnt_u11nad83.zip

20110515_0940_Playa_AZHVR503_per_pol_u11nad83.kmz

20110516_1912_Playa_AZHVR503_USFS_roads_u11nad83.lyr

GPS data files:

20110516_0930_Playa_AZHVR503_GPS_feat_fobs_Lewis_llwgs84.gpx

20110516_1540_Playa_AZHVR503_GPS_lin_divs_Clark_u11nad83.shp

Figure 2.3 File Names (examples) (continued)

Map product files:

iap_8x11_land_20110514_2023_Playa_AZHVR503_0515Day.pdf

trans_letter_land_20110516_2120_Playa_AZHVR503_0517Day_150dpi.jpg

sit_ansi_d_land_20110517_0420_Playa_AZHVR503_0517Day.pdf

Multi-page map product files:

iap_11x17_land_MPall_20110516_2120_Playa_AZHVR503_0517Day.pdf

iap_11x17_land_MPindex_20110516_2120_Playa_AZHVR503_0517Day.pdf

iap_11x17_land_MP2_20110516_2120_Playa_AZHVR503_0517Day.pdf

Other supporting documents, spreadsheets, and other nongeospatial files:

20110514_1420_Playa_AZHVR503_GIS_practices.docx

20110516_1923_Playa_AZHVR503_ownership.xlsx

Figure 2.4 Incident Directory Structure

[yyyy]_incidents *(at the root level, where yyyy = the current calendar year)*

[yyyy_incident_name] *(e.g., 2011_maple, where yyyy = the year the incident started)*

- **base_data** *(base data not created on the incident, which do not require daily backup)*
  - **dem** *(digital elevation model data and derived products)*
  - **logos** *(agency logos, typically in nongeospatial raster format)*
  - **orthoimagery** *(ortho-corrected imagery)*
  - **other_maps** *(scanned maps, such as visitor or district maps)*
  - **topo_maps** *(scanned U.S. Geological Survey (USGS) quad maps, known as DRGs)*
  - **vector** *(vector data file types)*
- **documents** *(e.g., spreadsheets, text documents, unit log, digital photos used on maps)*
- **incident_data** *(data created on or for the incident)*
  - **incident geodatabase** *(the master incident geospatial database that contains the incident feature classes)*
  - **other incident geodatabase** *(an additional geospatial database that contains incident-specific feature classes not created and maintained by FIMT, such as TFRs or escape routes)*
  - **backups** *(date- and time-stamped backup incident geodatabases from incident geodatabase for disaster recovery purposes)*
  - **exports** *(date- and time-stamped incident geospatial data export files for exchange via FTP or other means)*
  - **final** *(final date- and time-stamped incident geospatial data export files for use by the hosting agency or other local organizations)*
  - **gps** *(optional: GIS data from field GPS downloads)*
  - **ir** *(optional: spatial data created by IRINs)*
  - **modified_base_data** *(base data edited for the incident, e.g., roads, ownership, and structures)*
  - **other optional folders or geodatabases** *(e.g., rehab/repair, FARSITE, sensitive data)*
  - **progression** *(workspace to create progression data)*
- **products** *(GIS map (e.g., .jpg, .pdf) and other product files produced on the incident)*
  - **[yyyymmdd]** *(all map products for the intended date of use, not the date of creation)*
  - **final** *(copies of all final map products for the incident)*
- **projects** *(GIS product map document (e.g., .mxd) files)*
  - **master map document files** *(the master map document files (.mxd), one for each map product)*
  - **backups** *(backup map document files (.mxd) copied from master map document files)*
- **tools** *(extensions, tools, or other software tools used on the incident)*

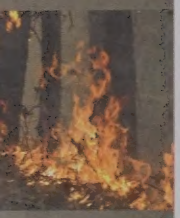
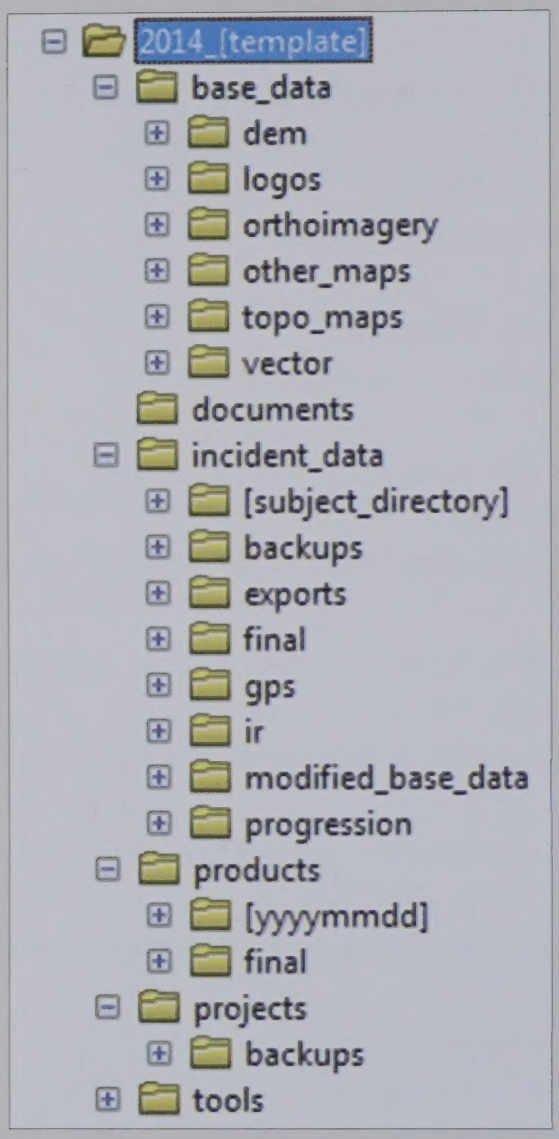


Figure 2.5 Incident Directory Catalog Template (example)



Quick Tip: If subfolders for "raw" data (e.g., gps) under the \incident_data folder become cumbersome, consider creating a third tier within them by date.

Figure 2.6 Incident Directory Catalog and File Names (example)

- 2013_incidents
  - 2013_[template]
  - 2013_Forge
    - base_data
      - dem
      - logos
      - orthoimagery
      - other_maps
      - topo_maps
      - vector
    - documents
      - 20130402_1230_Forge_PAVFP778_owner_summary.xlsx
    - incident_data
      - [subject_directory]
      - backups
        - 20130401_0830_Forge_PAVFP778_fimt100011.gdb
      - exports
        - 20130401_0940_Forge_PAVFP778_ics_flin_u18n83.shp
        - 20130402_2230_Forge_PAVFP778_ics_pnt_u18n83.shp
      - final
        - 20130403_1530_Forge_PAVFP778_fimt100011.gdb
      - gps
        - 20130402_1224_Forge_PAVFP778_GPS_feat_divs_Cleo_llw84.gpx
        - 20130402_1540_Forge_PAVFP778_GPS_lin_fobs_Marsh_u18n83.shp
      - ir
        - 20130403_0121_Forge_PAVFP778_IR_IntenseHeat_poly_u18n83.shp
      - modified_base_data
        - 20130401_1147_Forge_PAVFP778_modified_roads_u18n83.shp
      - progression
      - 2013_Forge_PAVFP778_fimt100011.gdb
      - 2013_Forge_PAVFP778_Other_Incident_Data_Arc10.gdb
        - i_20130401_0640_Forge_PAVFP778_tfr_5nm_pol_u18n83
        - i_20130402_1220_Forge_PAVFP778_evac_route_lin_u18n83
        - i_20130402_1330_Forge_PAVFP778_MP_Grid_Index_6_pg_11x17_land_u18n83
        - i_20130402_1650_Forge_PAVFP778_MAP_lin_u18n83
    - products
      - 20130402
        - trans_letter_land_150dpi_20130402_2120_Forge_PAVFP778_0517Day.jpg
      - final
    - projects
      - backups
        - sit_ansi_e_land_20130401_1224_Forge_PAVFP778.mxd
      - iap_11x17_land_MP_2013_Forge_PAVFP778.mxd
      - prog_ansi_d_land_2013_Forge_PAVFP778.mxd
      - sit_ansi_e_land_2013_Forge_PAVFP778.mxd
    - tools
      - 2013_Forge_PAVFP778_prog_processing.tbx
      - 2013_Forge_PAVFP778_File_Namer.xlsx

Figure 2.7. Common Abbreviations Used in File Names

This is a list of standard abbreviations for file naming; it is not all-inclusive. For other elements, select an unambiguous term to avoid confusion.

Date and Measurement Format

yyyy = year in which incident began, e.g., 2011
yyyymmdd = year, month, day, e.g., 20111207
ft = feet
hr = hours
mt = meters
nm = nautical miles

Incident Data Types

contin = Contingency Line
cpx = Complex
ctlflin = Controlled Fireline
damage = Damage caused by incident or suppression efforts
div = ICS division break locations
dzr = Dozer Line
flin = Fireline
hand = Handline
icp = Incident Command Post
ics = Incident Command System, features specific to ICS

Source Codes

divs = Division Supervisor
fobs = Field Observer
gps_feature_name = Global Positioning System (add feature + collector's name) e.g., "gps_lin_jones"
ir = Infrared
sitl = Situation Unit Leader

Feature Types

lin = line or polyline
pnt = point
pol = polygon
ras = raster

WFDSS (Wildland Fire Decision Support System) Terms

fl = flame length
fli = fireline intensity
fspro = fire spread probability
ntfb = near term fire behavior
ros = rate of spread
stfb = short term fire behavior

Figure 2.7 Common Abbreviations Used in File Names (continued)

Product Type

airops = Air Operations Map
areasc = Areas of Special Concern Map
brief = Briefing Map
dam = Damage Assessment Map
facil = Facilities Map
fhist = Fire Perimeter History Map
fuels = Fuels Map
iap = Incident Action Plan Map
ir = Infrared Information Map, also
ir_ortho = IR map with orthoimage base or
ir_topo = IR map with USGS topographic base
ops = Operations Map
owner = Ownership–Land Status Map
prog = Progression Map
rehab = Rehabilitation Map
sit = Situation Unit Map
struct = Structure Protection Map
trans = Transportation Map
veg = Vegetation Map
wfdss = Wildland Fire Decision Support System Map

> ***Quick Tip:*** Being consistent with your abbreviations is important. If abbreviations were established before your arrival, follow those guidelines rather than changing names mid-incident or editing existing files.

Page Orientation

land = landscape
MP = multi-page (such as IAP map)
port = portrait

Page Size

ansi_a or letter or 8x11 or 8_5x11 = 8½" x 11" paper
ansi_b or tabloid or 11x17 = 11" x 17" paper
ansi_c or 17x22 = 17" x 22" paper
ansi_d or 22x34 = 22" x 34" paper
ansi_e or 34x44 = 34" x 44" paper
arch_c or 18x24 = 18" x 24" paper
arch_d or 24x36 = 24" x 36" paper
arch_e or 36x48 = 36" x 48" paper
super_b or 13x19 = 13" x 19" paper

Figure 2.7 Common Abbreviations Used in File Names (continued)

Coordinate System Abbreviations (for data exchange files, feature classes, not appropriate for geodatabase names)
(coordinate system, datum)

ALB = Albers Equal-Area Conic Projection
Lam = Lambert Conformal Conic Projection
Ll = Latitude/Longitude (Geographic)
s+zone = State Plane Coordinate System (SPCS)
TM = Transverse Mercator Projection
u+zone = Universal Transverse Mercator Grid System

Datum Abbreviations
NAD27 = North American Datum 1927
NAD83 = North American Datum 1983
WGS84 = World Geodetic System 1984
CORS96 = NAD83 Continuous Operating Repeater System 1996
HARN = NAD83 H A R N
NSRS2007 = NAD83 NSRS2007

Statewide Systems Abbreviations
AKAlb = NAD 1983 Alaska Albers (Meters)
Teale = NAD 1983 California (Teale) Albers (Meters)
FLGDL = NAD 1983 Florida GDL Albers (Meters)
GALam = NAD 1983 Georgia Statewide Lambert (US Feet)
IDTM = NAD 1983 Idaho Transverse Mercator (Meters)
GeoRef = NAD 1983 Michigan GeoRef (Meters)
MSTM = NAD 1983 Mississippi Transverse Mercator (Meters)
ORLam = NAD 1983 Oregon Statewide Lambert (Intl Feet)
TCMSLam = NAD 1983 Texas Centric Mapping System Albers (Meters)
R6Albers = NAD 1983 USFS R6 Albers (Meters)
VALam = NAD 1983 Virginia Lambert (Meters)
WTM83 = NAD 1983 Wisconsin Transverse Mercator (Meters)
WYLam = NAD 1983 WyLam (Meters)

UTM (Universal Transverse Mercator), State Plane, and Geographic Examples
u13nad83 = UTM Zone 13, NAD 1983
u17nad27 = UTM Zone 17, NAD 1927
llnad83 = Latitude/Longitude; i.e., geographic NAD 1983
llwgs84 = Latitude/Longitude; i.e., geographic WGS 1984
{st}sp5nad83 = {state abbreviation} State Plane Zone 5, NAD 1983

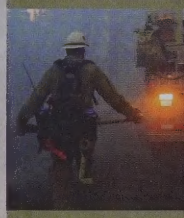
Chapter 3

Purpose

This chapter specifies responsibilities and outlines procedures for the daily documentation of significant events on an incident and for creating metadata for the geospatial datasets created or modified to support the Incident Management Team.

Specifications

On-incident documentation refers to all records—including, but not limited to, word processing documents, spreadsheets, telephone and e-mail messages, tabular information, GPS-gathered files, kml/kmz files, geospatial datasets, maps, and other output products—saved as official incident records. The Documentation Unit Leader (DOCL) in the Planning Section compiles this information for the entire incident, and then provides it to the host unit at the incident's conclusion. All official on-incident records can be used for investigations and lawsuits and should provide an accurate record of what information was available to support decisions and actions by overhead/line personnel.



Metadata (a form of documentation) provides information about specific GIS data layers to (a) allow end-users to understand the content and appropriate uses, and (b) preserve the long-term usability of the data layer. Generally, a metadata record contains information about the content, purpose, quality, lineage, point of contact, and attributes of the data layer it describes. Additional details about storing metadata (and other metadata considerations beyond the scope of GSTOP) are available through the website of the NWCG Geospatial Subcommittee (GSC) (*http://gis.nwcg.gov/*).

Procedures

Documentation

Documentation is a daily responsibility that starts as soon as work begins on an incident. The Incident Command System Unit Log, ICS 214 (*http://www.nwcg.gov/pms/forms/ics.htm*) is critical for tracking significant events occurring in an operational period. The Unit Log may be hardcopy or a digital file and may include attachments. Often, one Unit Log is kept for the Situation Unit as a whole, but occasionally a Unit Log may also be kept by each GISS.

Unit Logs and attachments from the GISS should provide a chronological, comprehensive, and accurate record of events related to geospatial support for the incident and significant changes to the incident data and the products produced. Typically, the Unit Log:

- Tracks products, showing dates created, due, and delivered
- Notates personnel transition and special assignments
- Records backup/archiving of data
- Reflects any issues or events that impact the GISS's ability to deliver products

Since the Incident Command System General Message Form, ICS 213 (*http://www.nwcg.gov/pms/forms/ics.htm*) is a common communication tool among units, attach it to the Unit Log and use it to document the events listed. Other attachments may include a list of the types of maps produced or any special products requested during an operational period. Use of the map element guidelines (STANDLSGD) described in Chapter 6, Map Products, will better enable products to serve as an official record of GISS work and can also be used to create the Unit Log and team transition/close-out documentation.

Metadata

File Naming Specifications: Metadata for specific files are embedded in the file name using a standard order of metadata elements. This practice facilitates archival retrieval and use by the hosting agency, GACC, and others, enabling easy recognition of the file content without the need to open the file or to explore more detailed metadata; metadata-embedded names also reduce the need for additional metadata elements. Embedding metadata in file names using consistent standards is a practical necessity, owing to stringent time constraints common during incident operations.

Standard file naming conventions are detailed in Chapter 2, File Naming and Directory Structure. As noted earlier, the general format consists of {date}_{incident information}_{other information}; however, map documents (.mxd files) and exported map product files (e.g., .jpg, .pdf) begin with map type, size, and orientation. Follow the rules described in Chapter 2 for different types of files (map documents, data files, export files, GPS-gathered files, and map products), so that the naming is consistent and quickly conveys information about the file. Figure 2.3, File Names (examples) lists sample file names for products and datasets common on an incident.

Incident Data: Use of the GSTOP naming conventions described in Chapter 2, with embedded metadata, may adequately convey data about the incident and may eliminate the need for other forms of metadata.

Modified Base Data: Base data used for incident support sometime require modification to be suitable for incident products. Such modification to existing metadata should document the changes, so that

subsequent team(s) and/or host unit personnel can understand how and why the data were changed and evaluate the long-term utility of the modified data. At a minimum, metadata should include:

- The reason why data were modified
- Contact information for the person who made the changes
- Description/name/path of any source data used
- Names/contact information for subject matter experts who directed the changes
- General description of processing steps
- Description of new attributes/coding schemes

Quick Tip: The Unit Log is for the benefit of the Situation Unit as a whole. The GISS tracks products and work using spreadsheets, other forms, etc., and should find the most efficient method to contribute to the Unit Log.

Content Standard for Digital Geospatial Metadata, vers. 2 (FGDC-STD-001-1998) (hereinafter referred to as CSDGM), found on the Federal Geographic Data Committee (FGDC) website, is the current U.S. federal metadata standard. The FGDC originally adopted the CSDGM in 1994 and then revised it in 1998. Each dataset obtained from a federal source should contain metadata per Executive Order 12906, "Coordinating Geographic Data Acquisition and Access: The National Spatial Data Infrastructure," as amended by Executive Order 13286 (March 2003). The standard is often referred to as the "FGDC Metadata Standard" and has been implemented beyond the federal level, with state and local governments adopting the standard as well.

The creators of GSTOP recognize the severe time limitations under which both a GISS and the Situation Unit as a whole operate while providing adequate geospatial support, and that metadata creation takes a secondary priority. It is usually impossible to encode fully all the entries required for FGDC-compliant metadata (*http://www.fgdc.gov/metadata/geospatial-metadata-standards*). However, taking a minute or two to add a paragraph describing the bulleted items under "Modified Base Data" above enables others to understand what was done to the data to accomplish the mission. This information and the use of standard file naming conventions for all incident data are vital for creating FGDC-compliant metadata postincident.

Responsibilities

The DOCL establishes, maintains, and prepares incident files for efficient retrieval for postincident use and, therefore, is a customer of the GISS. The DOCL files fire incident documentation according to the guidelines established under interagency wildland fire records management policy (revised 2005) and communicates documentation needs (hardcopy and/or digital) to the SITL.

The SITL determines what information the GIS will include in the Unit Log; determines what documentation the GISS will provide to the managing agencies and the DOCL; communicates these requirements to the GISS; and ensures that the GISS has the resources needed to fulfill these obligations.

The GISS uses standard file naming and directory structure as metadata for incident data layers; creates brief metadata for any modified base data; and provides agreed upon documentation to the DOCL and managing agencies as directed by the SITL. On incidents that do not have a SITL, the GISS works through the ICS chain of command to determine what documentation is required. The GISS documents the Unit Log daily and provides the incident GIS data and deliverables to the DOCL at team transition (see Chapter 7, Data Sharing, Backup, and Archiving).

Chapter 4

Purpose

This chapter addresses where to obtain and how to evaluate data for the minimum essential datasets—the base datasets (other than incident data) needed to meet the business needs of maps and analyses on wildland fire incidents.

Procedures

Datasets are vital to incident mapping. They are used to develop the primary maps for which the Situation Unit is responsible, as well as other maps, products, deliverables, and analyses (see Chapter 6, Map Products, for a list of primary and other maps).

This chapter distinguishes among three classes of datasets, as illustrated in Figure 4.1, Minimum Essential Datasets for Map Products:

- Datasets required for one or more primary maps
- Datasets required for one or more other maps
- Optional datasets

The GISS gathers or preorders the required datasets for the primary maps before arriving on an incident, along with as many of the required datasets for other map products and optional datasets as possible. If another GISS was previously assigned to the incident, these steps may already have been accomplished. The GISS should check with the SITL and/or GISS assigned. Specific information about preordering appears on the GSC website at *http://gis.nwcg.gov/gstop_symbol.html*. See Figure 4.2, Essential and Optional Dataset Specifications, for recommendations on obtaining base data, including possible data sources and required fields. Some datasets may be obtained from the local unit.

The GISS evaluates all datasets on the following aspects to determine if they will adequately meet the needs of the incident:

- Coordinate System and Datum Information: This must be available and can be in the form of a file containing coordinate system information for vector data and a world file for images or documentation associated with the dataset.
- Scale: The scale of the dataset should be suitable for use with other datasets and map imagery (e.g., roads digitized off small-scale state transportation maps may not be usable at the 1:24000 scale used for IAP maps).

- Currency: The dataset should be the most current available. (For example, aviation sectionals are updated at 6-month intervals.) Old versions should not be used; however, if it is necessary to use old versions because data have been requested but newer data cannot be located, add a source statement with date.
- Attributes: Datasets should contain meaningful attributes per Figure 4.2, Essential and Optional Dataset Specifications. Use caution when datasets have incomplete or undocumented attribution.
- Coded Attributes: A lookup translation table should be available for any codes.
- Security of Data: Limitations on the use and distribution of sensitive or proprietary data should be evaluated by seeking an agreement with the source of the data. Some datasets should not be distributed; others may have been procured under the premise that the data will be used only on the incident and that they will not be copied or distributed. Include information about the use of sensitive data in the transition briefing (see Chapter 8, Team Transition). A procedural document for the incident may be created in cooperation with the local unit and the SITL to ensure the proper handling of sensitive data. Appendix B, Sensitive Data Procedural Rules and Guidelines, is an example of a data-tracking document used on an incident.
- Spatial Accuracy: Datasets should meet locally acceptable accuracy requirements for a particular use. Marginal datasets may be used if a disclaimer is placed on the output product. Source statements in these situations are critical (e.g., 1:24000 Digital Line Graph road data).

Each dataset obtained from a federal source contains metadata per Executive Order 12906, "Coordinating Geographic Data Acquisition and Access: The National Spatial Data Infrastructure" as amended by Executive Order 13286 (March 2003).

Responsibilities

The GISS works with other personnel or teams (IRINs, Fire Behavior Analysts (FBANs), Burned Area Emergency Response (BAER) teams, and Area Command teams) to obtain, evaluate, and provide datasets needed for job functions.

Quick Tip: Source information is critical to choosing the proper or most useful data for the incident. If you do not include a source on the map that you create, be prepared to provide that information, to the best of your knowledge, to the SITL or other incident personnel.

Communications

Important contacts for the GISS:

- The SITL regarding available map layers, needed map layers, potential sources, etc.
- A CTSP to obtain Internet access (if available) for downloading datasets
- Local unit (agency), state, county, and city GIS staff to obtain best available versions of local datasets relevant to the incident

Figure 4.1 Minimum Essential Datasets for Map Products

	Primary Map Products					Other Map Products														
DATASET	Incident Action Plan (IAP) Map	Briefing Map	Situation Unit Map	Transportation Map	Progression Map	Air Operations Map	Areas of Special Concern Map	Damage Assessment Map	Facilities Map	Fire Perimeter History Map	Fuels Map	Infrared Information Map	Operations Map	Ownership–Land Status Map	Public Information Map	Rehabilitation Map	Structural Protection Map	Vegetation Map	Evacuation Plan	FARSITE/FSPro Layers
Class A - Datasets Required for One or More Primary Maps																				
Administrative Boundaries	O	O	R	O	O		O	O		O			R	R	O					
Airports, Helibases		O		O		R														
Aviation Hazards (including DAFIF and DVOF)		O	O			R														
GNIS Geographic Names Information System				O	O	R		O						R	O	O	O			
Hydrography (rivers, lakes)	O	O	O	O	O	R							R	O	O	O	O			O
Key Landmarks				R	R	R														
Ownership–Land Status	O	O	R	O	O		O	O		O			R	R	O					
Political Boundaries (city-county-state-nation)		O	R	O	O		O	O	O			O	O	O	O	O	O			
Roads	O	R	R	R	R	R		R		O			R		R		R		R	O
Shaded Relief			O		R	R	O	O		O	O	O	O	O	O	O		O		
Topographic Base (usually DRG)	R	O	O		R	O	O	O		O	R	R	R	O	O	O	O	R		
Class B - Datasets Required for One or More Other Maps																				
Archaeological Sites*							O						O							
Communities (GNIS Populated Places)				O			O						R		R					
Cultural Resources*							O						O							
DEMs (elevation, slope, aspect)																				R
Fire History Polygons							O			R										O
Fuels											R									R
Land Parcels								O						R			O			
Structures	O		O				O	R					O		O		R		R	
Subdivisions			O										R				O		R	
Vegetation							O										O	R		
Class C - Optional Datasets																				
Aviation Sectional						O														
Canopy Characteristics											O							O		R
Military Training Routes-Op Areas (MTRs/MOAs)						O														
National Grid**	O	O	O										O				O			
Orthoimagery (e.g., DOQQ, NAIP)	O		O				O	O		O		O	O	O	O	O	O			
Other Scanned Maps		O		O					O				O							
Public Land Survey		O	O	O				O					O							
Response Areas (direct protection areas)			O										O							
Retardant Exclusion Areas			O			O														
Schools															O		O			
Temporary Flight Restrictions (TFRs) (scale permitting)						R														
Threatened, Endangered, and Sensitive Species							O						O				O			
Wilderness	O	O	O		O	O							O				O			
Wildland Urban Interface (WUI)													O				O			

Legend: **R- Required layer for product** **O - Optional Layer - May be added if available and requested**

* These datasets may be used for land manager planning but may not be displayed on the final map, as the sites are sensitive and not for public display. These data should not be shared without the permission of the source agency.

**National Grid may be used on All-Hazard DHS/FEMA Incidents

Figure 4.2. Essential and Optional Dataset Specifications

DATASET		Data Content and Specifications	Suggested Acquisition
Datasets for Primary Maps	Administrative Boundaries	Administrative agency	Prearrival
	Airports, Helibases	Name, type, latitude, longitude	Local unit
	Aviation Hazards (including DAFIF and DVOF)	Hazard type, elevation, latitude, longitude	Local unit
	GNIS (Geographic Names Information System)	Name, type	Prearrival
	Hydrography (rivers, lakes)	Name (optional)	Prearrival
	Key Landmarks	Name, type	Local unit
	Ownership–Land Status	Agency-owner name, contact info	Prearrival
	Political Boundaries (city-county-state-national)	Name	Prearrival
	Roads	Road names, road class, road surface, lookup tables with descriptions of coding (accurate for use at 1:24000 scale)	Prearrival
	Shaded Relief	Not applicable	Prearrival
	Topographic Base (e.g., DRG)	Source date, USGS standard color scheme—13 or 256 colors, revision date, collar removed, scan resolution 200–1,000 dpi	Prearrival
Datasets for Other Maps	Archaeological Sites	Contact info	Local unit
	Communities (GNIS Populated Places)	Name	Prearrival
	Cultural Resources	Contact info	Local unit
	DEMs (elevation, slope, aspect)	Resolution	Prearrival
	Fire History Polygons	Fire name, year	Local unit
	Fuels	Fire behavior fuel model	Local unit
	Land Parcels	Parcel ID, contact info (optional)	Local unit
	Structures	Address, risk assignment (optional)	Prearrival
	Subdivisions	Name	Prearrival
	Temporary Flight Restrictions	TFR number, elevation, frequencies	Prearrival
	Vegetation	Forest type, age, basal area, height	Local unit
Optional Datasets	Aviation Sectional	Source date	Prearrival
	Canopy Characteristics	Crown base height, crown bulk density, height to live crown base	Local unit
	Military Training Routes – Ops Areas	Number, elevation	Local unit
	National Grid	Only use when requested	Local unit
	Orthoimagery (e.g., DOQQ, NAIP)	Source date, resolution	Prearrival
	Other Scanned Maps	Source, source date	Local unit
	Public Land Survey	Township, range, section	Prearrival
	Response Areas (direct protection areas)	Name	Local unit
	Retardant Exclusion Areas	Source data	Local unit
	Schools	Name	Local unit
	Threatened, Endangered, and Sensitive Species	Type	Local unit
	Wilderness	Name	Local unit
	Wildland Urban Interface (WUI)	Type	Local unit

Chapter 5

Purpose

The use of standard symbols in mapping wildland fires facilitates fast and consistent interpretation of mapping products and helps prevent ambiguous map interpretation, which can become a safety issue during an incident. In the interest of encouraging safety, consistency, and readability, GSTOP describes the symbols that everyone should use when creating maps, whether digitally or by hand.

Specifications

The following acceptance criteria were used for symbol selection:

- GIS symbols should represent features that are incident-related.
- Standard GIS symbols must relate to the standard GSTOP map products.
- Symbols should be easily and quickly identifiable, whether displayed in color or in black-and-white.
- Symbols should be clearly distinguishable from other ICS symbols, whether displayed in color or in black-and-white.

Procedures

In 2014, *Wildland Fire Incident Management Field Guide* (PMS 210) replaced the 2004 NWCG *Fireline Handbook* (PMS 410-1), which had displayed the primary map symbols for incident maps. The 2014 field guide (while displaying some symbols) notes that GSTOP is now the source for the most current map symbology. This symbology appears in Figure 5.1, Standard Point Map Symbols, Figure 5.2, Standard Line Map Symbols, and Figure 5.3, Standard Polygon/Fill Map Symbols.

GSTOP is intended to be technology-independent. Standard symbols sets for currently accepted GIS software packages (e.g., ArcGIS style set), along with instructions for loading the symbology, can be found on the GSC website (*http://gis.nwcg.gov/gstop_symbol.html*). Generally, it is best to assemble the standard symbology as a set of symbols for distribution. The symbols are also available individually as graphics files to be incorporated into any GIS, GPS, or mobile application software that allows custom symbols.

To ensure clear communication, common map conventions (e.g., blue for hydrologic features) should be observed if possible, and national symbology standards should be used where appropriate (e.g., show BLM ownership per Figure 5.4, Suggested Ownership Color Ramp). See Figure 5.5, Suggested Aviation Elevation RGB Color Ramp & FAA Legend (example), for a suggested aviation elevation color ramp.

Accompanying text (labels or annotation) must be given for symbols that look identical when displayed in black-and-white: for example, Drop Point ("DP") and Helispot ("H"). Use the text not only as a designator of the symbol type but also as an identifier of a particular feature (e.g., DP-1, DP-2, H-5). Hot Spot symbols look very similar to Drop Points and Helispots when displayed in black-and-white, so care must be taken to place any identifying text close enough to its map symbol to avoid confusion with nearby symbology.

Choice of symbol size is at the discretion of the GISS and the SITL. See Chapter 6, Map Products, for more cartographic recommendations.

Quick Tip: A timely, readable map, one that is easy to understand, trumps aesthetics on an incident! Use standard symbols and logical label size and placement.

Responsibilities

The SITL ensures that standard map symbology is used for mapping wildland fire incidents. The GISS uses the standard GIS map symbology and (if applicable) standard map symbol colors but may adapt (e.g., enlarge, use halo) the symbology for map readability while maintaining the essential design of the standard symbols.

Communications

The GISS communicates with the SITL regarding the use of standard mapping symbology on an incident. This is especially important if the GISS uses cartographic license to enhance map symbols.

Quick Tip: A 2014 GSTOP symbology ArcGIS.style file is available for download at *http://gis.nwcg.gov/gstop_symbol.html.*

Map Symbol Definitions

Active Burnout: The location where burnout operations are occurring.

Aerial Hazard: A hazard for aircraft, such as towers and power lines.

***Aerial Ignition:** Ignition of fuels by dropping incendiary devices or materials from aircraft. (This is most often displayed as a line feature, but may be represented as a point.)

Branch Break: A location where branches adjoin. Branches are identified by opposing bracket symbols--][--and by either Roman numerals or functional name (service, support) labels and are numbered clockwise from the Fire Origin.

***Camp:** Geographical site(s) within the general incident area, separate from the Incident Base, equipped and staffed to provide sleeping, food, water, and sanitary services to incident personnel.

Completed Burnout: An area inside a control line where fire has been set to consume fuel between the edge of the fire and the control line.

Completed Dozer Line: Completed fireline constructed by the front blade of a dozer. The map symbol for this line is often interpreted to encompass a fireline created by all mechanical means.

Completed Line: Any type of completed fireline that serves as a control line.

Division Break: Location of division boundaries. Divisions are identified with opposing parenthesis symbols--)(--and labels, where lettering is designated from A to Z, clockwise from the Fire Origin. The naming scheme is created to allow for the addition or subtraction of divisions.

Drop Point: A predefined location where personnel, equipment, and supplies will be delivered or picked up.

***Escape Route:** A preplanned and understood route firefighters take to move to a safety zone or other low-risk area.

Fire Break: A natural or constructed barrier used to stop or check fires that may occur, or to provide a control line from which to work.

Fire Origin: (also called *Point of Origin) The (best known) location of ignition and sustained combustion.

Fire Spread Prediction: A line used to show the predicted fire edge at a certain date and time.

Fire Station: A structure or other area set aside for storage of firefighting apparatus, such as fire engines and related vehicles, personal protective equipment, fire hoses, and other specialized equipment. It may also have dormitory living facilities and work areas for the use of firefighters.

First Aid Station: A station where emergency care or treatment is provided before regular medical aid can be obtained.

Foam Drop: The location where foam is dropped from aircraft during fire suppression operations.

Gate: The location of a gate.

***Handline:** (completed) Fireline constructed with hand tools.

***Helibase:** The main location within the general incident area for parking, fueling, maintenance, and loading of helicopters. It is usually located at or near the Incident Base.

***Helispot:** A natural or improved takeoff and landing area intended for temporary or occasional helicopter use.

Highlighted Geographic Feature: A significant geographic feature that is highlighted on maps.

Highlighted Manmade Feature: A significant human-constructed feature that is highlighted on maps.

***Hot Spot:** A particularly active part of a fire. (The map symbol for a Hot Spot is similar to the symbols for Drop Point and Helispot, but it is slightly larger.)

***Incident Base:** Location at the incident where the primary logistics functions are coordinated and administered. (Incident name or other designator will be added to the term "base.") The Incident Command Post may be collocated with the Incident Base. There is only one base per incident.

***Incident Command Post:** Location where primary command functions are executed. It may be collocated with the Incident Base or other incident sites.

IR Heat Perimeter: Perimeter of a heat area, as interpreted by IRINs from data derived by infrared sensors.

IR Intense Heat Area: An area of intense heat, as interpreted by IRINs from data derived by infrared sensors.

IR Isolated Heat Source: A single heat source isolated from areas of intense or scattered heat, as interpreted by IRINs from data derived by infrared sensors.

IR Scattered Heat Area: An area of scattered heat, as interpreted by IRINs from data derived by infrared sensors.

Line Break: A constructed barrier used to stop or check fires that may occur, or to provide a control line from which to work.

***Lookout:** (1) A person designated to detect and report fires from a vantage point; (2) a location from which fires can be detected and reported; (3) a fire crew member assigned to observe the fire and warn the crew when there is danger of becoming trapped.

***Management Action Points (MAPs):** Geographic points on the ground or specific points in time where an escalation of management actions, or an alternative management action, is warranted. These points are defined, and the management actions to be taken are clearly described, in approved fire management or land management plans. (Also called trigger points or trigger lines.)

MediVac Site: A mobile medical treatment and transportation site.

Mobile Weather Unit: A special weather station for forecasting weather for a specific incident, prepared by a meteorologist onsite at or near the incident area.

Planned Fireline: An inclusive term for all planned, constructed barriers intended to control a fire.

Planned Secondary Line: Any fireline planned for construction at a distance from the fire perimeter concurrently with or after a line already constructed on or near the perimeter of the fire, generally constructed as an insurance measure in case the fire escapes control by the primary line.

Proposed Burnout: A proposed area inside a control line where fire will be set to consume fuel between the edge of the fire and the control line.

Proposed Dozer Line: Proposed fireline constructed by the blade of a dozer.

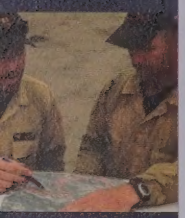
Pump: Location where a water pump or pumps are established during fire activities.

***Repeater:** (mobile relay) A radio signal station that automatically relays a radio transmission, sometimes over an additional, different frequency, thereby increasing the range of transmission. Repeaters are often named for the mountaintops or peaks where they are installed.

***Retardant Drop:** The location where fire retardant cascaded from an air tanker or helitanker.

Road as Completed Line: Used to delineate when a road is used as a fuel break in fire suppression activities. This can include roads that have had the adjacent fuels modified to improve their ability to stop the spread of the wildfire.

Safety Zone: An area cleared of flammable materials, where shelter deployment is not necessary, used for escape if the line is outflanked or if a Spot Fire causes fuels outside the control line to render the line unsafe. In fire operations, crews progress while maintaining a Safety Zone close by, allowing the fuels inside the control line to be consumed before moving ahead. Safety Zones may also be constructed as integral parts of fuel breaks.



Segment Break: The location of a segment boundary. A segment may be a portion of a division or an area inside or outside the perimeter of an incident. Segments are identified with Arabic numerals (e.g., A-1). Segments are identified by opposing "greater than/less than" --> <--symbols.

***Spot Fire:** The location of a fire ignited outside the perimeter of the main fire by a firebrand. (The arrow of the Spot Fire symbol should be rotated to point in the direction the Spot Fire is spreading.)

***Staging Area:** A location set up at an incident where resources can be placed while awaiting a tactical assignment on a three (3) minute available basis. Staging areas are managed by the Operations Section.

***Temporary Flight Restriction (TFR):** A restriction requested by an agency and put into effect by the Federal Aviation Administration in the vicinity of an incident to restrict the operation of nonessential aircraft in the airspace around that incident.

Uncontrolled Fire Edge: A fire edge that is actively burning and spreading across the landscape.

Water Drop: The location where water is dropped from aircraft during fire suppression operations.

***Water Source:** Any strategically located supply of water that is readily available for pumps, tanks, trucks, helicopters, helitankers, or fire camp use.

Wind Speed Direction: Compass direction from which the wind is blowing.

Zone Break: Location of zone boundaries. Zones are the highest order in dividing an incident into geographic areas of operation.

*Based on the definition listed in the NWCG Glossary of Wildland Fire Terminology (PMS 205).

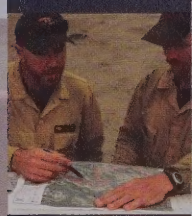


Figure 5.1 Standard Point Map Symbols

NWCG GIS Standard Operating Procedures (GSTOP) on Incidents – Point Symbol

- Aerial Hazard *(purple)*
- Aerial Ignition *(red)*
- Branch Break *(numbered clockwise from origin)*
- Camp (Name) *(blue)*
- Division Break *(lettered clockwise from origin)*
- Drop Point (Name, e.g. DP-1)
- Fire Origin (Date Time) *(red)*
- Fire Station *(blue)*
- First Aid Station *(blue)*
- Gate
- Helibase *(blue)*
- Helispot (Name, e.g. H-1) *(blue)*
- Hot Spot (Date Time) *(red)*
- Incident Base *(blue)*
- Incident Command Post *(blue)*
- IR Isolated Heat Source *(red)*
- Lookout *(blue)*
- MediVac Site *(red cross, blue outer circle)*
- Mobile Weather Unit *(white on blue)*
- Pump *(blue)*
- Repeater, Mobile Relay *(blue)*
- Safety Zone *(yellow fill)*
- Segment Break
- Spot Fire (Date Time) *(red)* *(arrow to be rotated in direction of spot fire movement)*
- Staging Area (Name) *(blue)*
- Water Source (Identify Type) *(blue)*
- Wind Speed Direction (Dir/Speed Time Date)
- Zone Break

Figure 5.2 Standard Line Map Symbols

NWCG GIS Standard Operating Procedures (GSTOP) on Incidents – Line Symbols

- Active Burnout *(black line , red hash)*
- Aerial Hazard *(purple)*
- Aerial Ignition *(red)*
- Completed Burnout
- Completed Dozer Line
- Completed Line
- Escape Route *(green)*
- Fire Break Planned or Incomplete
- Fire Spread Prediction (Date Time) *(orange)*
- Foam Drop
- H - H - Handline Completed
- Highlighted Geographic Feature
- Highlighted Manmade Feature
- Line Break Completed
- Management Action Point (MAP) *(orange)*
- Planned Fireline
- Planned Secondary Line
- Proposed Burnout
- Proposed Dozer Line
- Retardant Drop
- R - R - Road as Completed Line
- Uncontrolled Fire Edge *(red)*
- Water Drop

Quick Tip: Offset a feature, such as a Completed Line, to ensure the visibility of another line feature on the map (e.g., a road). Adjust the offset in ArcMap using the Symbol Property Editor. Instructions for applying an offset can be found at *http://gis.nwcg.gov/gstop_symbol.html*.

Figure 5.3 Standard Polygon/Fill Map Symbols

NWCG GIS Standard Operating Procedures (GSTOP) on Incidents – Line Polygon /Fill Symbols

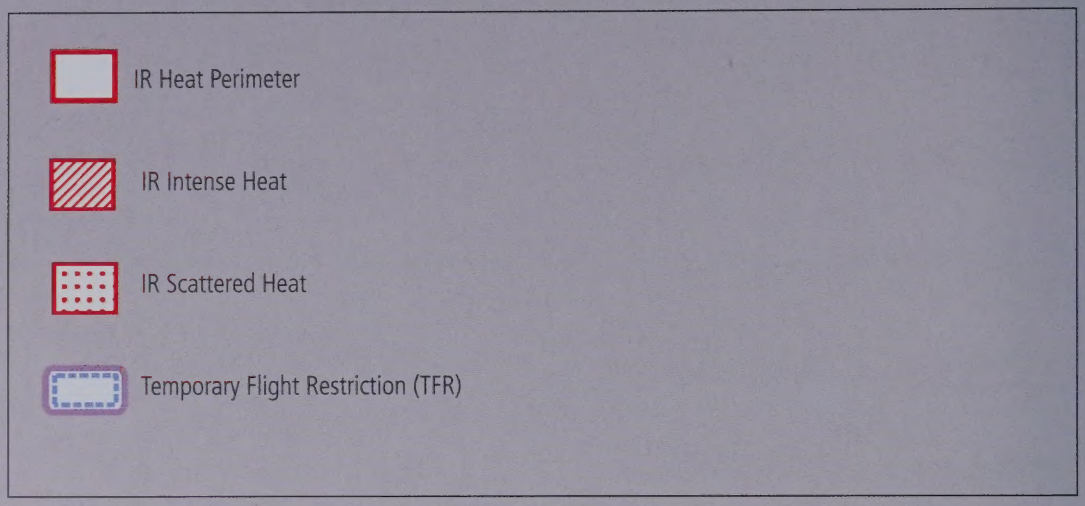


Figure 5.4 Suggested Ownership Color Ramp

III-3

H-1553-PUBLICATION STANDARDS MANUAL HANDBOOK

Map Ownership Matrix

CMYK	RGB (ArcView HSV)	Pantone	
0-10-50-0	254-230-121 (34-134-254)	141C	Bureau of Land Management (BLM)
0-10-20-0	254-230-191 (26-64-254)	475C	BLM Oregon and California Lands (O&C)
0-20-60-0	254-204-92 (29-163-254)	135C	BLM Wilderness Area
20-0-20-0	204-235-197 (77-41-235)	351C	US Forest Service (USFS)
30-0-60-0	179-222-105 (58-134-222)	367C	USFS O&C
40-0-40-0	153-213-148 (82-78-213)	345C	USFS Wilderness Area
20-20-0-0	202-189-220 (188-36-220)	665C	National Park Service (NPS)
30-40-0-0	177-137-193 (201-74-193)	2563C	NPS Wilderness Area
50-0-30-0	127-204-167 (107-96-204)	563C	US Fish and Wildlife (USFW) National Wildlife Refuge
60-0-50-0	102-191-127 (97-119-191)	346C	USFW Wilderness Area
10-0-30-0	230-245-177 (52-71-245)	365C	National Grasslands
0-0-30-0	255-255-179 (42-76-255)	601C	Bureau of Reclamation
0-30-50-0	253-180-108 (21-146-253)	472C	Indian Reservation (IR)
0-40-60-0	253-154-82 (17-173-253)	157C	IR Wilderness Area
0-30-5-0	251-180-206 (240-72-251)	203C	Military Reservations and Corps of Engineers
10-20-30-0	228-196-159 (22-77-228)	4665C	Other Federal
30-0-0-0	179-227-238 (135-63-238)	2975C	State
50-0-0-0	107-207-226 (134-134-226)	2915C	State Wilderness Area
0-20-10-0	252-205-207 (254-47-252)	196C	Bankhead-Jones Land Use Lands
30-0-0-20	143-181-190 (136-63-190)	551C	State, County, City; Wildlife, Park and Outdoor Recreation Areas
0-0-0-0	255-255-255 (0-0-255)		Private

Colors on a printed product may differ from the colors shown above; colors may be affected by any combination of variables inherent to four-color process printing. These variables include, but are not limited to, film and plate registration, plate quality, type and weight of paper stock, different types of process color ink, printing press dot gain, print run color sequence, press color control, and pressmanship.

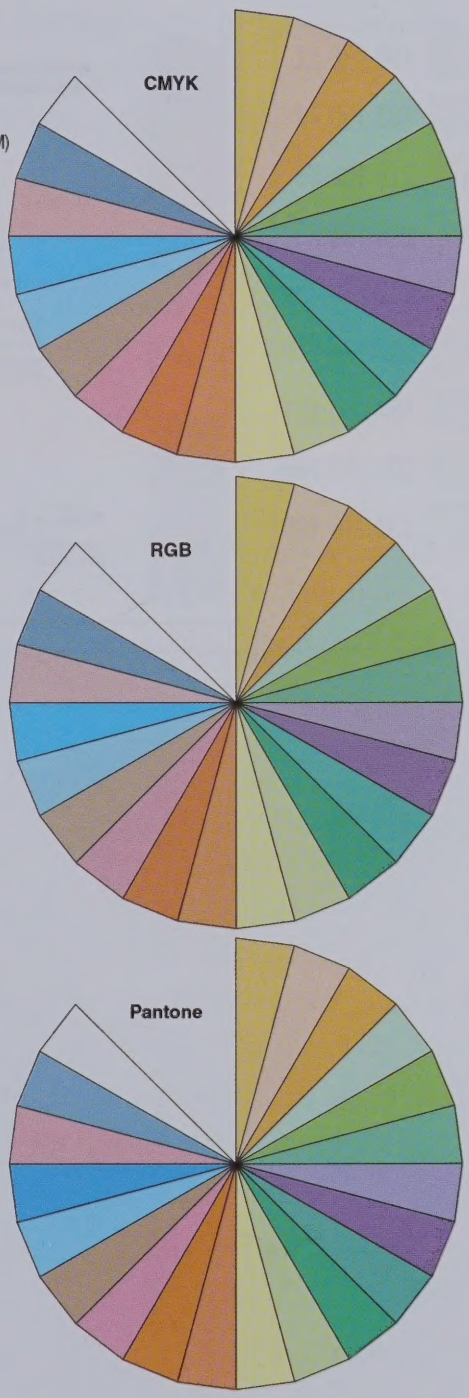
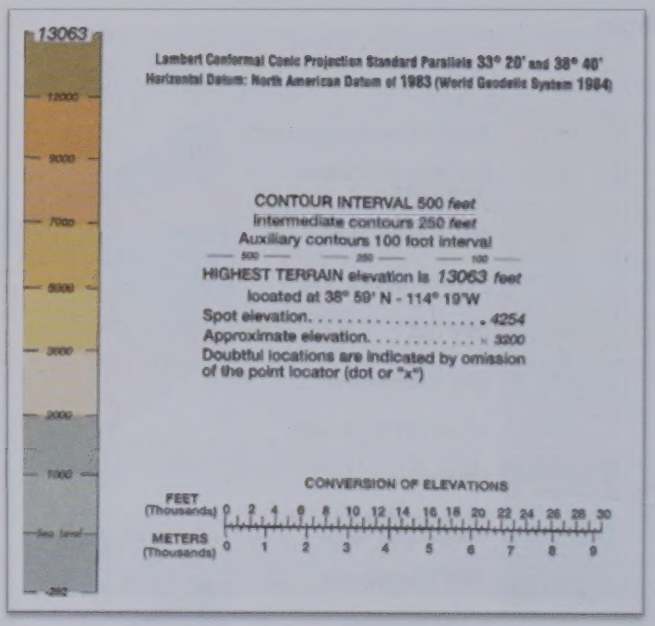


Figure 5.5 Suggested Aviation Elevation RGB Color Ramp & FAA Legend (example)

RGB Color Ramp

168 136 72
193 150 79
216 168 88
225 188 72
232 216 120
232 224 176
184 200 151
200 216 168
230 246 198

Example of FAA Section Map Legend:


13063
12000
9000
7000
5000
3000
2000
1000
Lambert Conformal Conic Projection Standard Parallels 33° 20' and 38° 40'
Horizontal Datum: North American Datum of 1983 (World Geodetic System 1984)
CONTOUR INTERVAL 500 feet
Intermediate contours 250 feet
Auxiliary contours 100 foot interval
HIGHEST TERRAIN elevation is 13063 feet
located at 38° 59' N - 114° 19'W
Spot elevation. 4254
Approximate elevation. 3200
Doubtful locations are indicated by omission of the point locator (dot or "x")
CONVERSION OF ELEVATIONS
FEET (Thousands) 0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30
METERS (Thousands) 0 1 2 3 4 5 6 7 8 9

Chapter 6

Purpose

Primary map products are those maps that are produced by the Situation Unit and that are frequently used during wildland fire incidents. This chapter provides guidelines for creating the primary GIS map products associated with an incident. Additional map definitions are also presented for other GIS maps that may be requested.

Quick Tip: A map's appearance on the list of primary maps does not necessarily mean that the map is made more frequently than others. However, because all the primary maps are the responsibility of the GISS, it is vital that the GISS is proficient in creating them.

The objective here was not to create an impossible standard, nor to create a standard for every possible product; these standards are intended as guidelines only. The GISS will need to be flexible in applying these standards, as the SITL and other end-users may have specific needs or preferences. The most important criteria in the preparation of map products are the operational business drivers (i.e., primary use) for the cartographic products. The primary use should drive the focus of the maps. After the operational period, however, other business drivers (i.e., secondary uses) may need to be considered. The need to archive data from incidents adequately, as a historical record, may create additional needs (see Chapter 7, Data Sharing, Backup, and Archiving.)

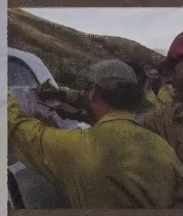
Specifications

Maps produced on an incident should communicate the intended message clearly. Map products should adhere to:

- ICS symbology standards (see Chapter 5, Map Symbology, or the *Wildland Fire Incident Management Field Guide* (PMS 210) (2014)
- Use of standardized colors for maps printed in color (refer to USGS standards, *http://nationalmap.gov/ustopo/images/US_Topo_Map_Symbols.pdf*); e.g., blue for water, green for vegetation

As regards accuracy and completeness of map products:

- Data are current.
- Features are in the correct location.
- Map scale is accurate.
- Map is complete and readable.



All map products produced should include **STANDL** (**S**cale, **T**itle, **A**uthor, **N**orth arrow, **D**ate of preparation, **L**egend) cartographic elements:

- **S**cale: A graphical expression of a fixed distance, such as 1,000 feet or 1 mile. A textual description, such as 1:24,000 or 1" = 1 mile is useful if the map is printed at the desired output size; however, because digital maps (such as PDFs) can be printed at various sizes, it is preferable to use a graphical scale bar.
- **T**itle: The basic description of the map, including items such as incident name and map type. The Unit Identifier and the Local Incident Identifier are included (e.g., ID-BOF-0095). The title may also include the operation date for which the map was prepared and the operational period (day/night).
- **A**uthor: The person or group that prepared the map.
- **N**orth arrow: The graphical display used to orient the map correctly. This element could also include additional direction indicators for magnetic declination or grid angle.
- **D**ate of preparation: The date appears near the author's name on the map. Software tools allow the automatic insertion of this element onto the map with minimal effort.
- **L**egend: The key that describes the meaning of the symbols found on the map.

SGD (**S**ource statement, **G**raticule/grid, **D**atum) map elements should be on the Incident Action Plan (IAP) map, and are recommended for use on other maps, as appropriate.

- **S**ource statement(s): Date and time that key map elements (e.g., fire perimeter) were collected. Source statements may be embedded in the legend or in the title box. Other citations for data and/or features on a map may be included, such as source, collection method, accuracy, and coordinate system/projection.
- **G**raticule/grid: This element is typically a graticule of latitude and longitude marks and numbers that allows referencing of the mapped area to the specific area on the Earth. This element can also be in the form of other grid coordinates, such as the Universal Transverse Mercator grid system, State Plane, Public Land Survey System (PLSS), or the United States National Grid.
- **D**atum: The datum *must* be noted on the map when a graticule/grid is used or if coordinates are displayed. The correct datum is critical for GPS use.

Procedures

The map products described in this chapter are classified as either "primary" or "other." The GIS Specialist PTB lists the primary maps as those that a GISS trainee must successfully produce to become fully qualified as a GISS. Other maps may also be requested. The list of other maps presented in this chapter is not all-inclusive, and other, unlisted special map products may be requested. The desired elements for these maps are typically provided by the person requesting the map through the SITL; if not, the GISS should request additional guidance.

Other procedural considerations include:

- The SITL (or equivalent) decides which maps to produce and approves final versions.
- The SITL directs the use of logos.
- Placement of fire acreage (and total acreage reported) on maps is at the discretion of the SITL.
- The GISS should consider page size and whether color is needed; many maps may need specific formatting and may be reproduced on black-and-white copy machines.
- The GISS schedules map production to meet specific deadlines (see NWCG's *Wildland Fire Incident Management Field Guide* (PMS 210) (2014).
- North arrow may need to be rotated to indicate true north correctly.
- Drafts: Maps that are for review only may include "DRAFT."
- Sensitive information: Maps may need labels defining the sensitivity of the data (e.g., "For Official Use Only," "Not for Public Distribution or Use"); distribution of such maps should be restricted and tracked. Appendix C, Sensitive Data Map Disclaimer, is a map disclaimer that may be used on maps containing sensitive data. See also Appendix D, Sensitive Information Map Custody Log. This log, or a similar type of document, may be necessary for tracking and limiting distribution of hardcopy maps with sensitive data that are used on the incident.
- Disclaimers: Maps may include disclaimers if requested or required under delegated authority (e.g., "For Reference Only").
- Proprietary information: Maps should cite the source for any proprietary information.

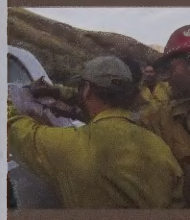
Responsibilities

Timelines for map production are established with the SITL, PSC, or the assigned supervisor. The GISS generates all products on time for scheduled briefings and other meetings. Map definitions should be used as general guidelines; the SITL or PSC has the authority to deviate from the standards.

Quick Tip: Using dynamic text in ArcMap is a great way to update map elements efficiently!

Communications

All incident map requests are channeled through the SITL or PSC so they are kept informed of the GISS workload and can help prioritize needs. The SITL or PSC may instruct the GISS to work with the end-user of the map to clarify map product requirements. Final map products are approved by the SITL or PSC (or assigned supervisor) before release, unless otherwise arranged.



Map Products: Descriptions and Examples

Primary Maps

The Situation Unit produces six primary maps and may be involved in producing or providing inputs for other maps and products. Of these, the five primary maps that the GISS produces, as listed in the GIS Specialist PTB, are (listed in order of typical workflow):

- Incident Action Plan Map (59)
- Briefing Map (61)
- Situation Unit Map (63)
- Transportation Map (65)
- Progression Map (67)

The sixth primary map created by the Situation Unit is the Facilities Map, which is often created by someone other than the GISS. Because a GISS may be asked to create this map, this map product is listed below in the "Other Maps" section.

Other Maps

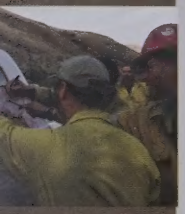
Additional maps that a GISS may be asked to produce include, but are not limited to, the maps listed below and described under "Other Maps." (Note: These maps are listed alphabetically, not in order of importance or demand.)

- Air Operations Map (69)
- Areas of Special Concern Map (70)
- Damage Assessment Map (71)
- Facilities Map (72)
- Fire Perimeter History Map (73)
- Fuels Map (74)
- Infrared Information Map (75)
- Operations Map (76)
- Ownership–Land Status Map (77)
- Public Information Map (78)
- Rehabilitation Map (79)
- Structure Protection Map (80)
- Vegetation Map (81)

Quick Tip: A workflow for map products, beginning with the Incident Action Plan Map or Situation Unit Map, may expedite the creation and updating of maps.

Examples of the five primary maps appear in the "Primary Maps" section below. These figures may be printed and used individually as stand-alone job aids.

See the Geospatial Subcommittee website (*http://gis.nwcg.gov/gstop_mapsamples.html*) for more map examples.



Primary Maps

Product Name

Incident Action Plan (IAP) Map ***PRIMARY***

Product Description

The ***Incident Action Plan Map*** is the primary map used by operations personnel and is included in the Incident Action Plan.

Typical Map Requester

Planning Section Chief, Operations Section Chief

Target Audience

Incident Commander, Planning Section, Operations Section, Safety Officer, incident personnel

Objective

The ***Incident Action Plan Map*** effectively communicates geographic feature relationships and incident management objectives on an incident. This map is of the highest priority. It is a tool used by operations staff to display field assignments, crew instructions, and division safety concerns at the operational period briefings and breakout meetings. ***The Incident Action Plan Map*** is a tool for firefighter safety.

Guidelines

- Standard Incident Command System (ICS) symbology
- Black-and-white to enable clear duplication
- Letter (8½" x 11") or tabloid (11"x 17") size
- Mapped area should cover the incident area and predicted spread
- Generally 1:24,000 scale; 1:63,360 scale in Alaska (Situation Unit Leader may direct other scales)

Standard Elements

Cartographic

- Scale
- Title: Include Unit Identifier and Local Incident Identifier (e.g., ID-BOF-0095), the operation date for which the map was prepared, and operational period (day/night)
- Author
- North arrow
- Date of preparation
- Legend
- Source statement(s): Include date and time that key features were collected; may be embedded in the legend or title box
- Graticule/grid: Latitude-longitude graticule should be in the format used by target audience, as specified by Planning or Operations
- Datum

Data

- Incident perimeter, ICS line and point features (e.g., Drop Points, aviation features, Camps, Incident Command Post, Spot Fires, and Safety Zones)
- Division and Branch breaks and labels
- Topography (DRGs with the green turned off usually produce the best topographic line quality)

Optional Elements

- Index map (when multiple sheets are required)
- Structures
- Roads and road hazards (e.g., 4wd only, one way)
- Safety hazards
- Hydrography (e.g., rivers, lakes)
- Wilderness boundaries
- Disclaimer language (when incident information is estimated, changing quickly, or requested)
- Magnetic declination and date
- Management Action Point
- orthoimagery

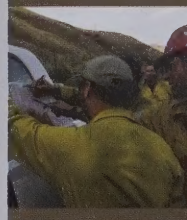
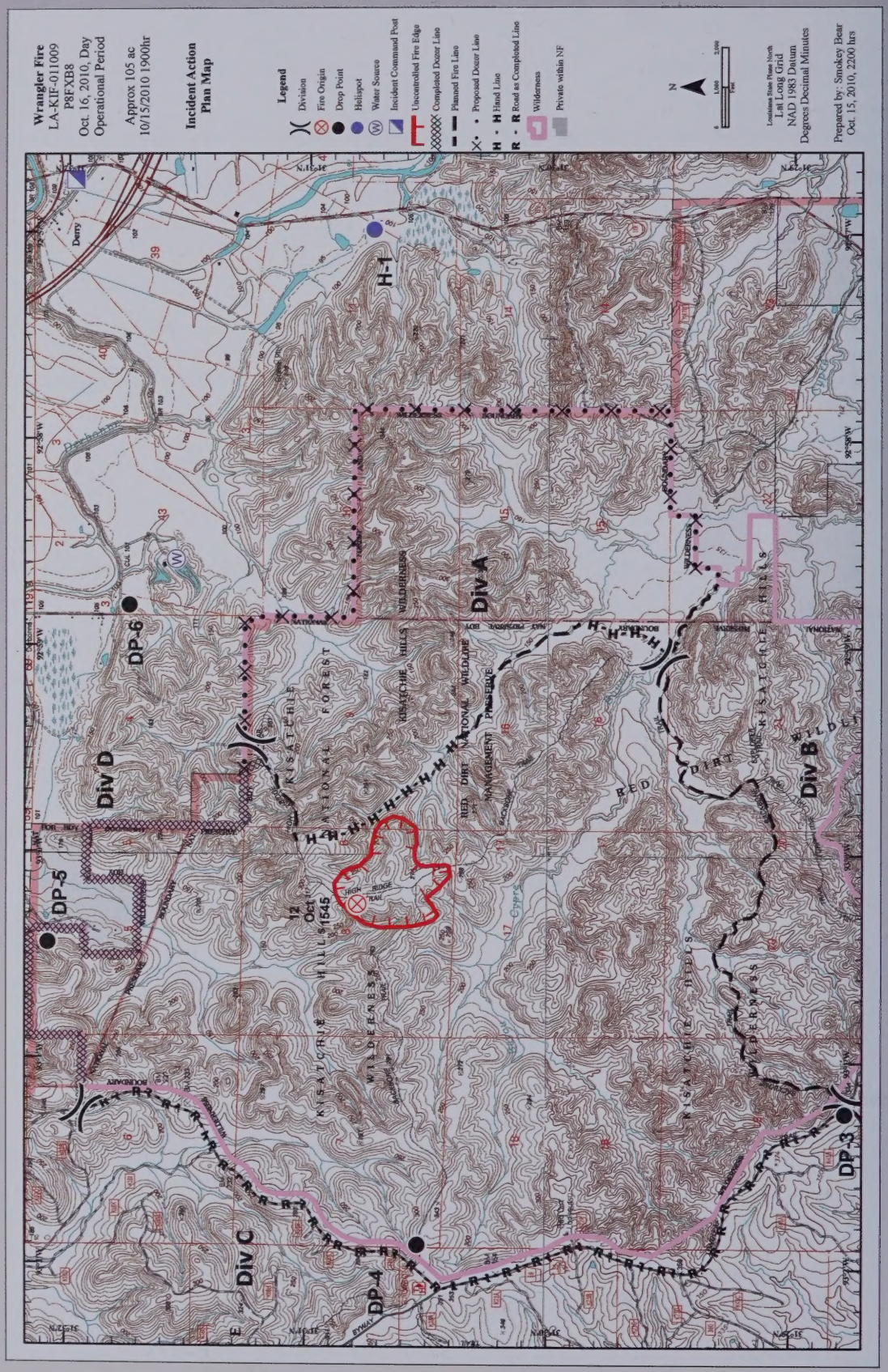


Figure 6.1 Incident Action Plan (IAP) Map (example)

iap_11x17_land_20101015_2200_Wrangler_LAKIF011009_1016day.pdf (size reduced to fit this page)



Product Name

Briefing Map ***PRIMARY***

Product Description

The ***Briefing Map*** is displayed in the briefing area and is used during operational briefings. It is a simplified, large-format map of the incident area and is used to discuss work assignments and other details.

Typical Map Requester

Operations Section Chief, Planning Section Chief, Safety Officer

Target Audience

Incident personnel attending the operational briefing: Incident Commander, Command Staff (Public Information Officer, Safety Officer, Liaison Officer), General Staff (Operations Section Chief, Planning Section Chief, Logistics Section Chief, Finance/Administration Chief), Fire Behavior Analyst, Strategic Operational Planner, Operations overhead

Objective

The ***Briefing Map*** communicates sufficient incident detail to brief personnel on the upcoming operational period.

Guidelines

- Standard Incident Command System (ICS) symbology
- Simple fonts and symbols, large enough to be read from the back of the briefing area
- Reduced clutter to enable clear communication
- Printed as large as possible to serve a large crowd and to be visible from a distance; "E" (34" x 44") size or larger (created using a page size that is smaller but with similar aspect ratio; the file is scaled up when printing); often may be tiled and assembled

Standard Elements

Cartographic

- Scale
- Title: Include Unit Identifier and Local Incident Identifier (e.g., ID-BOF-0095), the operation date for which the map was prepared, and operational period (day/night)
- Author
- North arrow
- Date of preparation
- Legend

Data

- Incident perimeter, ICS line and point features (e.g., Completed Line, Drop Points, Camps, Incident Command Post)
- Division and Branch breaks and labels
- Major transportation routes to and from the incident

Optional Elements

- Source statement(s): Include date and time that key features were collected; may be embedded in the legend or title box
- Graticule/grid & Datum: Latitude-longitude graticule should be in the format used by target audience
- Safety hazards
- Escape routes
- Topography or other scanned background map
- Administrative boundaries (e.g., jurisdiction), political boundaries (city-county-state-national)
- Ownership–land status
- Wilderness
- Airports, helibases
- Public Land Survey
- Hydrography (e.g., rivers, lakes)
- Management Action Points

Quick Tip: When an extra-large Briefing Map is needed for an extra-large crowd, use tiling options in ArcMap for printing, and piece together for display.

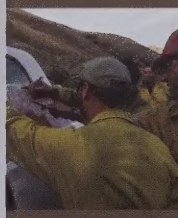
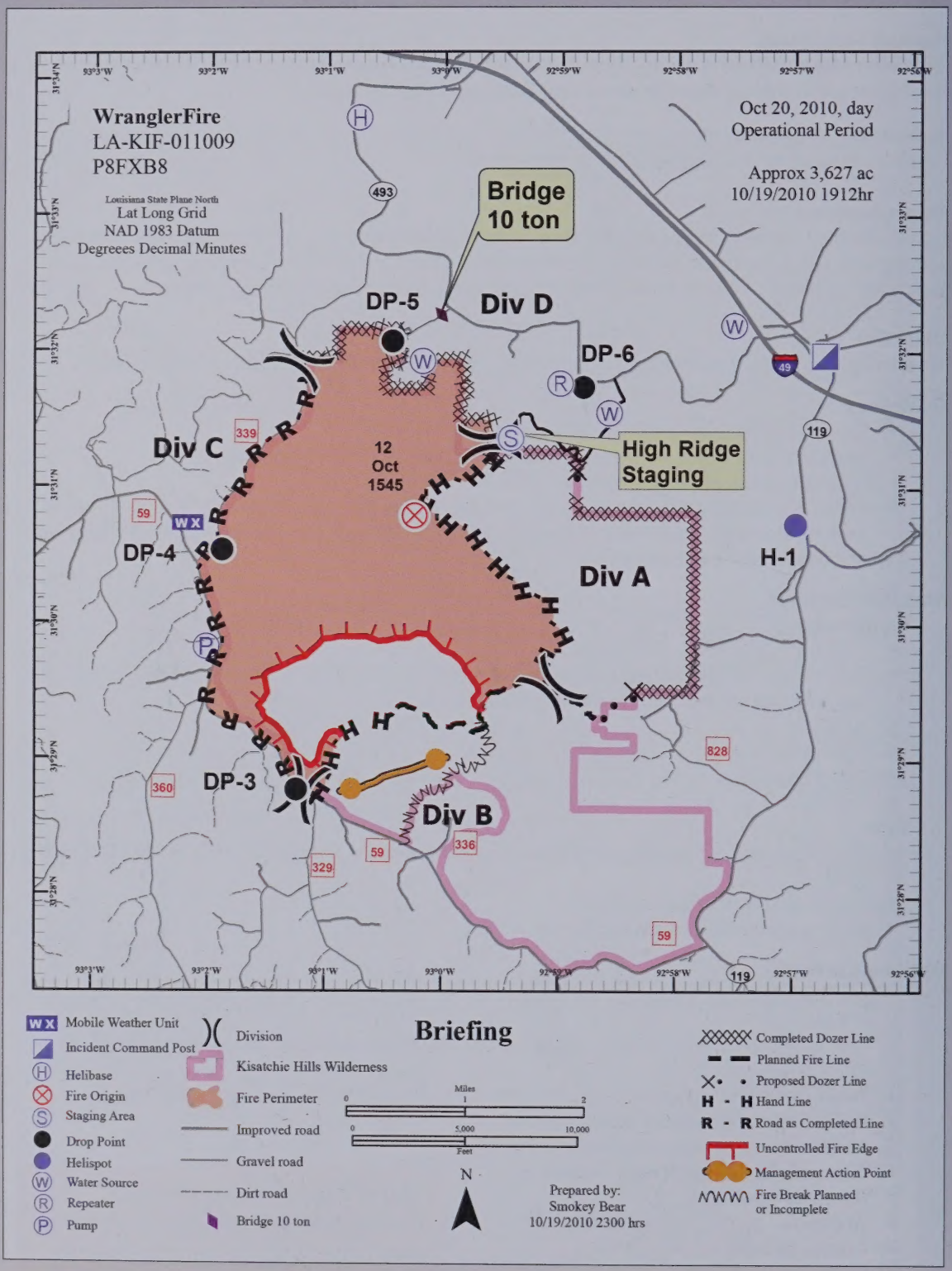


Figure 6.2 Briefing Map (example)

brief_letter_port_20101019_2300_Wrangler_LAKIF011009_1020day.pdf

Although created as an 8.5 x 11 layout, this map would be printed at E-size or larger for a briefing.



Product Name

Situation Unit Map ***PRIMARY***

Product Description

The ***Situation Unit Map*** is large-format map with an accurate, current, and detailed record of the incident information and is displayed in or near the Situation Unit area.

Typical Map Requester

Situation Unit Leader, Planning Section Chief, Incident Commander

Target Audience

Incident Commander, Command Staff (Public Information Officer, Safety Officer, Liaison Officer), General Staff (Operations Section Chief, Planning Section Chief, Logistics Section Chief, Finance/Administration Chief), agency representatives, Situation Unit Leader, Fire Behavior Analyst, Strategic Operational Planner

Objective

The ***Situation Unit Map*** is a geographic tool for participants at the Plans Meeting to develop incident strategies and alternatives. It is frequently used as the master map for tracking incident intelligence and is often used for debriefing.

Guidelines

- Standard Incident Command System (ICS) symbology
- Feature symbology discernible from the back of the meeting area
- Usually "D" (22" x 34") size or larger
- Usually 1:24,000 scale; 1:63,360 scale in Alaska

Standard Elements

Cartographic

- Scale
- Title: Include Unit Identifier and Local Incident Identifier (e.g., ID-BOF-0095), the operation date for which the map was prepared, and operational period (day/night)
- Author
- North arrow
- Date of preparation
- Legend

Data

- Incident perimeter, ICS line and point features (e.g., Dozer Line, Incident Command Post, Helispots)
- Division and Branch breaks and labels
- Transportation routes
- Safety hazards, if available
- Administrative boundaries (e.g., jurisdiction), political boundaries (city-county-state-national)
- Ownership–land status
- Appropriate base background, such as topographic (with or without shaded relief) or orthoimagery

Optional Elements

- Source statement(s): Include date and time that key features were collected; may be embedded in the legend or title box
- Graticule/grid & Datum: Latitude-longitude graticule should be in the format used by target audience, as specified by the Planning Section or Operations Section
- Escape routes
- Safety zones
- Hydrography (e.g., rivers, lakes)
- Wilderness
- Structures
- Subdivisions
- Response areas (direct protection areas)
- Retardant exclusion areas
- Management Action Points
- Public Land Survey
- Vicinity map(s)

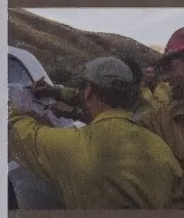
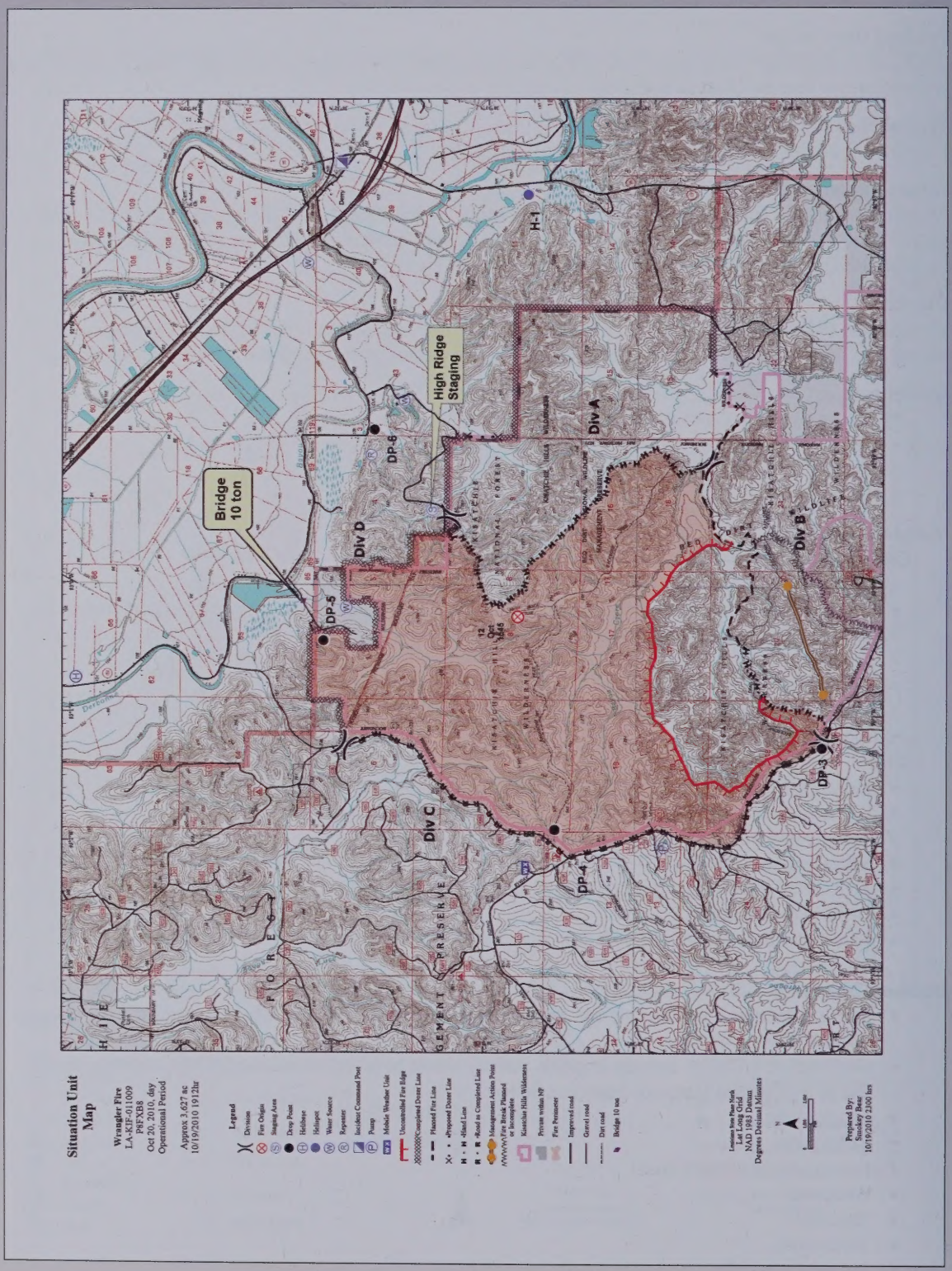


Figure 6.3 Situation Unit Map (example)

sit_ansi_c_land_20101019_2300_Wrangler_LAKIF011009_1020day.pdf (size reduced to fit this page)



Product Name

Transportation Map ***PRIMARY***

Product Description

The ***Transportation Map*** shows the access routes to the incident and is included in the Incident Action Plan (IAP).

Typical Map Requester

Planning Section Chief, Logistics Section Chief, Safety Officer

Target Audience

Safety Officer, Operations Section, Logistics Section, incident personnel

Objective

The ***Transportation Map*** provides an overview of the transportation network in the incident vicinity to support safe transportation. This map is used to facilitate land-based delivery of equipment, supplies, and personnel to and removal from the incident location. It is prepared for operational briefings and is inserted into the IAP.

Guidelines

- Standard Incident Command System (ICS) symbology
- Generally letter (8½"x 11") or tabloid (11"x 17") size
- Black-and-white to enable photocopying and faxing

Standard Elements

Cartographic

- Scale
- Title: Include Unit Identifier and Local Incident Identifier (e.g., ID-BOF-0095)
- Author
- North arrow
- Date of preparation
- Legend

Data

- Incident perimeter, ICS point features (e.g., Drop Points, Camps, Incident Command Post)
- Division and Branch breaks and labels
- Major roads and road names, type of route (e.g., dirt, 4wd only, one way)
- Route restrictions (e.g., bridge weight limits)
- Key landmarks

Optional Elements

- Source statement(s): Include date and time that key features were collected; may be embedded in the legend or title box
- Graticule/grid & Datum: Latitude-longitude graticule should be in the format used by target audience, as specified by Planning or Operations
- Incident line features
- Vicinity map(s)
- Distances labeled along travel routes
- Mile markers
- Disclaimer language
- Administrative boundaries (e.g., jurisdiction), political boundaries (city-county-state-national)
- Hydrography (e.g., rivers and lakes)
- Communities (GNIS populated places)

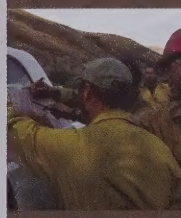
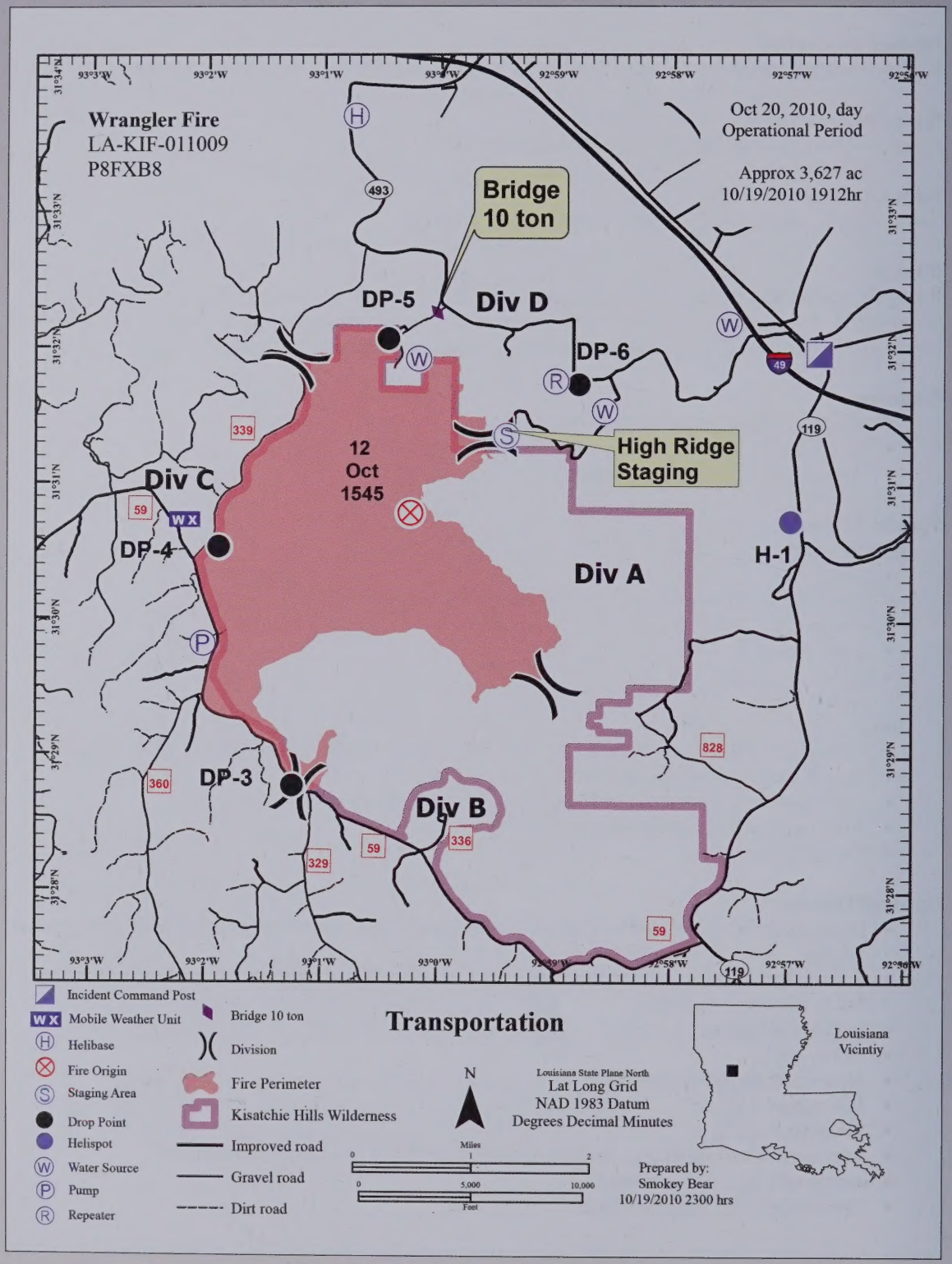


Figure 6.4 Transportation Map (example)

trans_letter_port_20101019_2300_Wrangler_LAKIF011009_1020day.pdf



Product Name

Progression Map ***PRIMARY***

Product Description

The ***Progression Map*** shows the areas affected by the incident over time and is displayed in the Operations Section and Situation Unit.

Typical Map Requester

Planning Section Chief, Incident Commander, Public Information Officer, Fire Behavior Analyst/Long Term Fire Analyst, Strategic Operational Planner

Target Audience

Planning Section, Incident Commander, host agencies, public

Objective

The ***Progression Map*** graphically displays the progression of the incident over the landscape.

Guidelines

- Can be scalable from letter (8 ½" x 11") to "E" (34" x 44") size
- If more than five time periods are shown, standardized color ramps are effective in showing trends rather than discrete values
- Distribution through the web should be considered

Standard Elements

Cartographic

- Scale
- Title: Include Unit Identifier and Local Incident Identifier (e.g., ID-BOF-0095)
- Author
- North arrow
- Date of preparation
- Legend

Data

- Point of origin
- Shaded relief base, topography base
- Key geographic features (e.g., mountains, valleys, peaks, and major roads)
- Perimeter for each time period (differing by color)

Optional Elements

- Source statement(s): Include date and time that key features were collected and acreage for each time period; may be embedded in the legend or title box
- Graticule/grid & Datum: Latitude-longitude graticule should be in the format used by target audience, as specified by Planning
- Administrative boundaries (e.g., jurisdiction), political boundaries (city-county-state-national)
- Ownership–land status
- Vicinity map(s)
- Hydrography (e.g., rivers, lakes)
- Wilderness

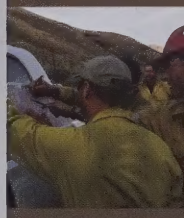
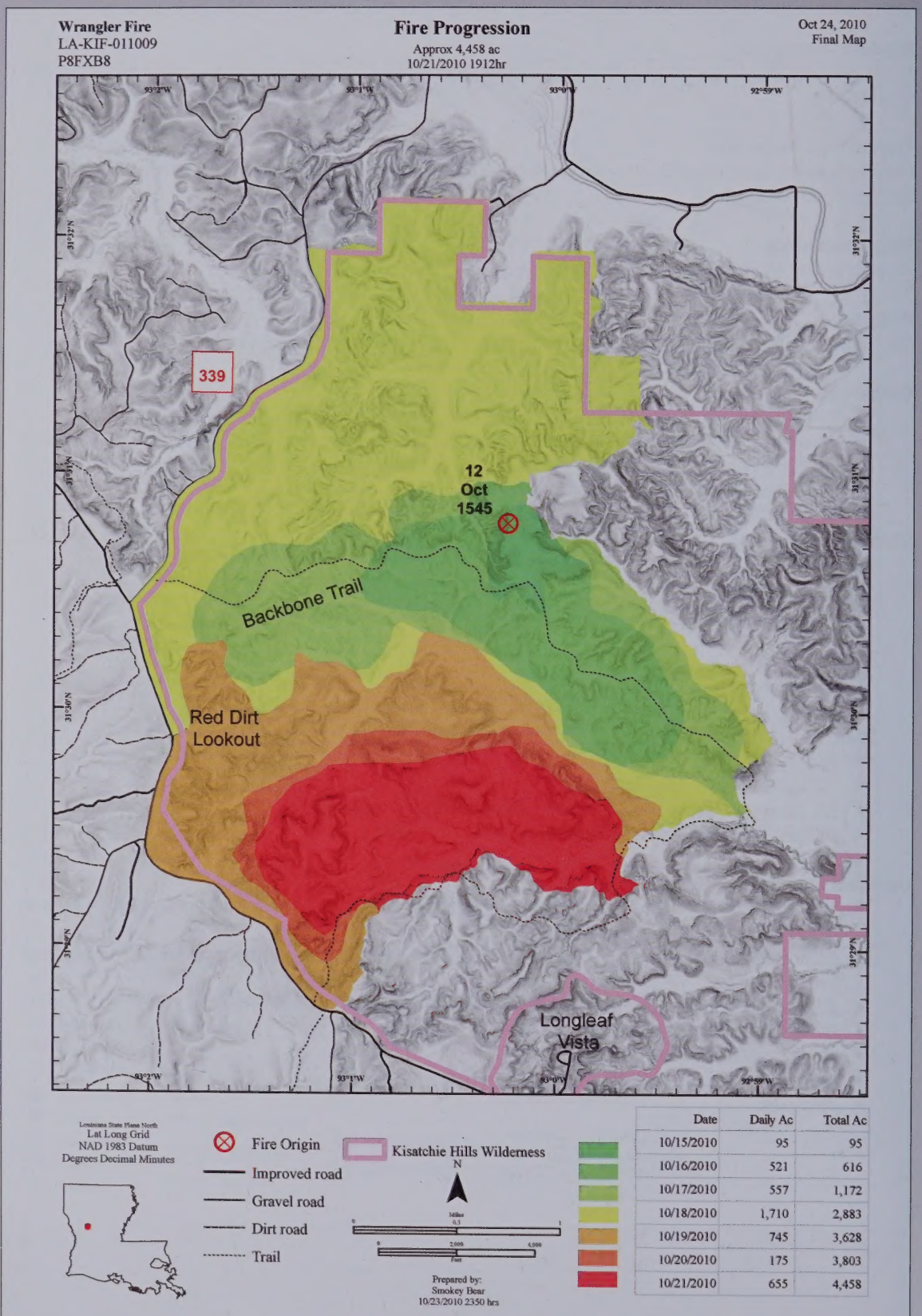


Figure 6.5 Progression Map (example)

final_prog_11x17_port _20101023_2352_Wrangler_LAKIF011009.pdf (size reduced to fit this page)



Other Maps

Product Name

Air Operations Map ***OTHER***

Product Description

The ***Air Operations Map*** is a map that displays features important for air operations.

Typical Map Requester

Air Operations Branch Director

Target Audience

Air Operations Branch, pilots

Objective

The ***Air Operations Map*** provides air operations with enough detail to aid in locating key features on an incident.

Guidelines

- Standard Incident Command System (ICS) symbology
- Minimal clutter on map
- Small size for lap reading in aircraft

Standard Elements

Cartographic

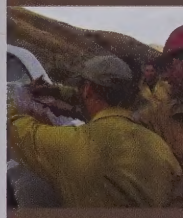
- Scale
- Title: Include Unit Identifier and Local Incident Identifier (e.g., ID-BOF-0095), the operation date for which the map was prepared, and operational period (day/night)
- Author
- North arrow
- Date of preparation
- Legend

Data

- Incident perimeter, ICS line and point features
- Division and Branch breaks and labels
- Airports, helibases
- Aviation hazards (e.g., transmission lines, mountain peaks with elevation labels, towers)
- Roads
- Key landmarks
- Hydrography (e.g., rivers, lakes)
- Temporary Flight Restrictions (TFRs) (when in place) and TFR number, height, and frequency, if available
- Elevation shaded relief or Federal Aviation Administration sectionals (suggested color ramp, Figure 5.5)

Optional Elements

- Source statement(s): Include date and time that key features were collected; may be embedded in the legend or title box
- Graticule/grid & Datum: Latitude-longitude graticule should be in degrees, decimal minutes
- Table or labels showing latitude and longitude of key locations
- Topographic data
- Wilderness boundaries
- Frequency table
- Retardant exclusion areas
- Military training routes and military operations areas
- Management Action Points



Product Name
Areas of Special Concern Map ***OTHER***

Product Description
The ***Areas of Special Concern Map*** shows sensitive cultural or environmental areas in the vicinity of the incident.

Typical Map Requester
Planning Section Chief, Operations Section Chief, Liaison Officer

Target Audience
Operations Section, Resource Advisor, Archaeologist

Objective
The ***Areas of Special Concern Map*** is used in operational planning to identify sensitive areas, such as endangered species' habitats or locations, cultural resources, and other areas at risk.

Guidelines
- Standard Incident Command System (ICS) symbology
- Coordinate symbology for areas of concern with local Resource Advisor
- Not for public distribution

Standard Elements

Cartographic
- Scale
- Title: Include Unit Identifier and Local Incident Identifier (e.g., ID-BOF-0095)
- Author
- North arrow
- Date of preparation
- Legend

Data
- Cultural or environmental areas of concern
- Present fire perimeter and ICS line and point features

Optional Elements
- Source statement(s): Include date and time that key features were collected; may be embedded in the legend or title box
- Graticule/grid & Datum: If appropriate
- Topographic base or orthoimagery base
- Shaded relief
- Structures
- Communities (GNIS Populated Places)
- Ownership–land status
- Schools
- Archaeological sites**
- Administrative boundaries (e.g., jurisdiction), political boundaries (city-county-state-national)
- Fire history perimeter polygons (perhaps colored by decade, with year labels)
- Cultural resources**
- Threatened, endangered, and sensitive species**
- Vegetation
- Wildland Urban Interface
- Management Action Points

**These datasets may be used for planning but should not be displayed on the final map, as the sites are sensitive and not for public display. These data should not be shared without the permission of the source agency.

Product Name

Damage Assessment Map ***OTHER***

Product Description

The ***Damage Assessment Map*** displays the structures damaged by the incident.

Typical Map Requester

Planning Section Chief, Operations Section Chief, Liaison Officer, Structure Protection Specialist, Information Officer

Target Audience

Planning Section, Operations Section, Liaison Officer, Structure Protection Specialist, public

Objective

The ***Damage Assessment Map*** tracks structures and resources damaged in the incident. This product is used in operational planning and public meetings.

Guidelines

- Should be made at a scale to distinguish individual structures
- May be made early in an incident to serve as a triage tool

Standard Elements

Cartographic

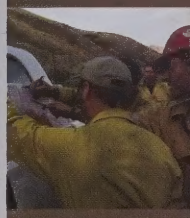
- Scale
- Title: Include Unit Identifier and Local Incident Identifier (e.g., ID-BOF-0095), the operation date for which the map was prepared, and operational period (day/night)
- Author
- North arrow
- Date of preparation
- Legend

Data

- Incident perimeter
- Structures symbolized based on type or extent of damage
- Roads, including road names and address ranges (if available)

Optional Elements

- Source statement(s): Include date and time that key features were collected; may be embedded in the legend or title box
- Graticule/grid & Datum: If appropriate; latitude-longitude graticule should be in the format used by target audience, as specified by Planning or Operations
- Land parcel data
- Administrative boundaries (e.g., jurisdiction), political boundaries (city-county-state-national)
- Ownership–land status
- Topographic base (with or without shaded relief)
- Vicinity map(s)
- Orthoimagery base
- Key landmarks



Product Name
Facilities Map ***OTHER***

Product Description
The ***Facilities Map*** shows the layout of the incident facilities at the Incident Command Post (ICP) or Incident Base/Camp and is included in the Incident Action Plan.

Typical Map Requester
Logistics Section Chief, Safety Officer

Target Audience
Logistics Section, incident personnel, law enforcement, visitors or inhabitants

Objective
The ***Facilities Map*** assists individuals in locating various resources and support functions in and around the ICP.

Guidelines
- Standard Incident Command System symbology
- May be schematic

Standard Elements

Cartographic
- Scale: Often not to scale, in which case, use that statement instead of a scale bar
- Title: Include Unit Identifier and Local Incident Identifier (e.g., ID-BOF-0095)
- Author
- North arrow
- Date of preparation
- Legend

Data
- Locations of ICP resources and support functions

Optional Elements
- Source statement(s): Include date that key features were collected; may be embedded in the legend or title box
- Graticule/grid & Datum: If appropriate
- Vicinity map(s)
- Political boundaries (city-county-state-national)
- Orthoimagery base or other scanned map

Product Name

Fire Perimeter History Map ***OTHER***

Product Description

The ***Fire Perimeter History Map*** shows the areas of previous fires in the area of the current incident.

Typical Map Requester

Planning Section Chief, Operations Section Chief

Target Audience

Fire Behavior Analyst, Long Term Fire Analyst, Strategic Operational Planner, Operations Section

Objective

The ***Fire Perimeter History Map*** is used in fire behavior and operational planning to determine where fires have burned in the past and where the current active fire may progress, based on the area's fire perimeter history.

Guidelines

- Standard Incident Command System (ICS) symbology

Standard Elements

Cartographic

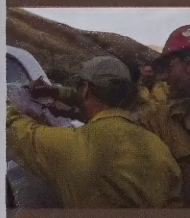
- Scale
- Title: Include Unit Identifier and Local Incident Identifier (e.g., ID-BOF-0095)
- Author
- North arrow
- Date of preparation
- Legend

Data

- Fire history polygon perimeters (perhaps colored by decade, with year labels)
- Current fire perimeter, ICS line features

Optional Elements

- Source statement(s): Include date that key features were collected; may be embedded in the legend or title box
- Graticule/grid & Datum: If appropriate
- Topographic base
- Shaded relief
- Orthoimagery base
- Roads
- Administrative boundaries



Product Name
Fuels Map ***OTHER***

Product Description
The ***Fuels Map*** displays the surface fuels in the area of the incident.

Typical Map Requester
Planning Section Chief, Operations Section Chief

Target Audience
Fire Behavior Analyst, Long Term Fire Analyst, Strategic Operational Planner, Operations Section

Objective
The ***Fuels Map*** shows the fuels in the area of the fire perimeter. It may be used by Fire Behavior Analysts to help predict fire behavior, to develop suppression strategies, and to develop rehabilitation strategies.

Guidelines
- Standard Incident Command System (ICS) symbology
- Color fuel types

Standard Elements

Cartographic
- Scale
- Title: Include Unit Identifier and Local Incident Identifier (e.g., ID-BOF-0095), the operation date for which the map was prepared, and operational period (day/night)
- Author
- North arrow
- Date of preparation
- Legend

Data
- Fire behavior fuel models
- Current fire perimeter, ICS line features

Optional Elements
- Source statement(s): Include date and time that key features were collected; may be embedded in the legend or title box
- Graticule/grid & Datum: If appropriate
- Topographic base
- Shaded relief
- Fuel model canopy characteristics

Product Name
Infrared Information Map ***OTHER***

Product Description
The ***Infrared Information Map*** is a large-format topographic map showing the interpretation of remotely sensed infrared imagery of the entire incident.

Typical Map Requester
Planning Section Chief, Operations Section Chief

Target Audience
Planning Section, Operations Section

Objective
The ***Infrared Information Map*** is a geographic tool for the Situation Unit to use in determining the incident perimeter and key areas of operational focus.

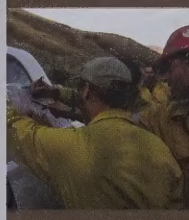
Guidelines
- Standard Incident Command System (ICS) symbology
- May be produced by the Infrared Interpreter
- Usually 1:24,000 scale; 1:63,360 scale in Alaska

Standard Elements

Cartographic
- Scale
- Title: Include Unit Identifier and Local Incident Identifier (e.g., ID-BOF-0095), the operation date for which the map was prepared, and operational period (day/night)
- Author
- North arrow
- Date of preparation
- Legend

Data
- Heat perimeter, isolated heat sources, heat areas by intensity (if available)
- Incident perimeter, ICS line and point features

Optional Elements
- Source statement(s): Include date and time that key features were collected; may be embedded in the legend or title box
- Graticule/grid & Datum: If appropriate; latitude-longitude graticule should be in the format used by target audience, as specified by Planning or Operations
- Topographic base
- Shaded relief
- Vicinity map(s)
- Orthoimagery base
- Political boundaries (city-county-state-national)



Product Name
Operations Map ***OTHER***

Product Description
The ***Operations Map*** is used by operations personnel for strategy, tactics, and planning purposes.

Typical Map Requester
Operations Section Chief, Planning Section Chief

Target Audience
Operations Section, Planning Section, Safety Officer

Objective
The ***Operations Map*** effectively displays geographic and incident features for use by operations personnel (Operations Section Chief, branch directors, division/group supervisors) either in the Incident Command Post or out in the field.

Guidelines
- Standard Incident Command System (ICS) symbology
- Printed in color to enable clear depiction of incident and map features
- Size varies but usually anywhere from tabloid (11" x 17") to "E" (34" x 44") size
- Scale varies based on request and area covered and map size
- May be one map for the entire incident or multiple maps for various areas of interest, such as organizational divisions

Standard Elements

Cartographic
- Scale
- Title: Include Unit Identifier and Local Incident Identifier (e.g., ID-BOF-0095), the operation date for which the map was prepared, and operational period (day/night)
- Author
- North arrow
- Date of preparation
- Legend

Data
- Incident perimeter, ICS line and point features
- Division and Branch breaks and labels
- Transportation routes
- Safety hazards, if available
- Administrative boundaries, political boundaries (city (subdivisions)-county-state-national)
- Ownership–land status
- Appropriate base background, such as topographic or orthoimagery

Optional Elements
- Source statement(s): Include date and time that key features were collected; may be embedded in the legend or title box
- Graticule/grid & Datum: Latitude-longitude graticule should be in format used by target audience, specified by Planning or Operations
- Roads and road hazards (e.g., 4wd only, one way), if available
- Hydrography (e.g., rivers, lakes)
- Wilderness
- Structures
- Shaded relief
- Data source citation (if data are special or requested)
- Disclaimer language (when incident information is estimated, changing quickly, or requested)
- Magnetic declination and date
- Management Action Points

Product Name

Ownership–Land Status Map ***OTHER***

Product Description

The ***Ownership–Land Status Map*** shows the ownership or land status for the areas impacted by the incident. It graphically depicts the land ownership or fire protection responsibility in the area of the incident.

Typical Map Requester

Planning Section Chief, Incident Commander, Finance Section Chief, Liaison Officer, Information Officer

Target Audience

Planning Section, Incident Commander, Finance Section Chief, Liaison Officer, agency representatives, public

Objective

The ***Ownership–Land Status Map*** is used in operational planning, public meetings, and cost apportionment.

Guidelines

- Can be scalable from letter size (8 ½" x 11") to "E" (34" x 44") size
- If the ownership is public, it is best to use a standardized color palette to avoid confusion (see Figure 5.4, Suggested Ownership Color Ramp, depicting, e.g., BLM land status)

Standard Elements

Cartographic

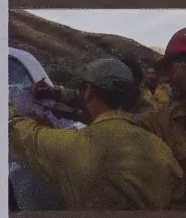
- Scale
- Title: Include Unit Identifier and Local Incident Identifier (e.g., ID-BOF-0095)
- Author
- North arrow
- Date of preparation
- Legend

Data

- Incident perimeter, Incident Command System line features
- Ownership–land status (see Figure 5.4, Suggested Ownership Color Ramp, for suggested color ramp)
- Key landmarks
- Data source citation
- Incident origin (may be sensitive information, so may not be shown on draft maps until authorized)

Optional Elements

- Source statement(s): Include date and time that key features were collected; may be embedded in the legend or title box
- Graticule/grid & Datum: If appropriate; latitude-longitude graticule should be in the format used by target audience, as specified by Planning or Operations
- Total acres or percentage of area affected, by owner
- Vicinity map(s)
- Topographic base (with or without shaded relief)
- Orthoimagery base
- Administrative boundaries, if different from ownership; political boundaries (city-county-state-national)
- Hydrography (e.g., rivers, lakes)
- Disclaimer (use when incident information is estimated, changing quickly, or requested)
- Management Action Points



Product Name
Public Information Map ***OTHER***

Product Description
The ***Public Information Map*** shows the area affected by the incident.

Typical Map Requester
Information Officer

Target Audience
Public

Objective
The ***Public Information Map*** keeps the public informed of the incident's location. It is used in public meetings and for bulletin boards and displays. Many different types of public information maps may be requested to fit specific needs of the public for information.

Guidelines
- Should be made at a scale large enough for public meetings, where key landmarks (e.g., cities, highways) help with incident orientation
- Letter-size copies may also be needed for handouts at meetings
- Should never include archaeological, cultural, or threatened and endangered point data

Standard Elements

Cartographic
- Scale
- Title: Include Unit Identifier and Local Incident Identifier (e.g., ID-BOF-0095)
- Author
- North arrow
- Date of preparation
- Legend

Data
- Incident perimeter
- Incident Command Post location
- Major towns
- Roads and road names
- Communities (GNIS Populated Places)

Optional Elements
- Source statement(s): Include date and time that key features were collected; may be embedded in the legend or title box
- Graticule/grid & Datum: If appropriate
- Incident Command System line features
- Public meeting places, schools, campgrounds or lodges, other structures, if available
- Evacuation areas, if established
- Roadblocks, if established
- Information board locations
- Hydrography (e.g., rivers, lakes)
- Administrative boundaries (e.g., jurisdiction), political boundaries (city-county-state-national)
- Ownership–land status
- Topographic or orthoimagery base
- Vicinity map(s)
- Shaded relief
- Key landmarks

Product Name
Rehabilitation Map ***OTHER***

Product Description
The ***Rehabilitation Map*** shows the rehabilitation requirements, and progress of rehabilitation efforts, for the areas impacted by the incident.

Typical Map Requester
Planning Section Chief, Operations Section Chief, Burned Area Emergency Response (BAER) team, Liaison Officer, Resource Advisor

Target Audience
Planning Section, Operations Section, BAER team, Information Officer, Resource Advisor, public

Objective
The ***Rehabilitation Map*** is used to assist in rehabilitation efforts in the area of the incident; e.g., by the home unit or possibly by a BAER team. This product is used in operational planning and public meetings.

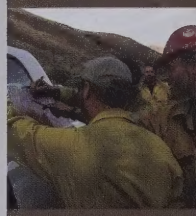
Guidelines
- Standard Incident Command System (ICS) symbology
- Should be made as a tool for use long after the Incident Management Team has left, showing where the fire burned and what operations were performed

Standard Elements

Cartographic
- Scale
- Title: Include Unit Identifier and Local Incident Identifier (e.g., ID-BOF-0095), the operation date for which the map was prepared, and operational period (day/night)
- Author
- North arrow
- Date of preparation
- Legend

Data
- Incident perimeter, ICS line features
- Treatments (uniquely symbolized)

Optional Elements
- Source statement(s): Include date and time that key features were collected; may be embedded in the legend or title box
- Graticule/grid & Datum: If appropriate; latitude-longitude graticule should be in the format used by target audience, as specified by Planning or Operations
- Acreage affected for each treatment
- Shaded relief base
- Topographic base
- Orthoimagery base
- Vicinity map(s)
- Key landmarks
- Political boundaries (city-county-state-national)
- Hydrography (e.g., rivers, lakes)
- ICS point features



Product Name

Structure Protection Map ***OTHER***

Product Description

The ***Structure Protection Map*** shows the buildings potentially threatened by the incident.

Typical Map Requester

Operations Section Chief, Safety Officer, Liaison Officer, Structure Protection Specialist, Information Officer

Target Audience

Operations Section, Safety Officer, Liaison Officer, Structure Protection Specialist, public

Objective

The ***Structure Protection Map*** tracks structures and resources that could be impacted by the incident. This product is used in operational planning and public meetings.

Guidelines

- Standard Incident Command System (ICS) symbology
- Should be made at a scale to distinguish individual structures
- May be made early in an incident to serve as a triage tool

Standard Elements

Cartographic

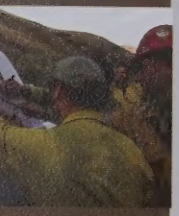
- Scale
- Title: Include Unit Identifier and Local Incident Identifier (e.g., ID-BOF-0095), the operation date for which the map was prepared, and operational period (day/night)
- Author
- North arrow
- Date of preparation
- Legend

Data

- Incident perimeter
- Structures symbolized based on type or triage
- Structure addresses or ID numbers
- Management Action Points
- Evacuation routes
- Roads, including road names and address ranges (if available)

Optional Elements

- Source statement(s): Include date and time that key features were collected; may be embedded in the legend or title box
- Graticule/grid & Datum: If appropriate; latitude-longitude graticule should be in the format used by target audience, as specified by Operations
- Land parcel data
- Topographic base
- Vicinity map(s)
- Orthoimagery base
- Key geographic features
- Administrative boundaries (e.g., jurisdiction); political boundaries (city-county-state-national)
- Ownership–land status
- Roadblocks
- ICS features



Product Name
Vegetation Map ***OTHER***

Product Description
The ***Vegetation Map*** displays the vegetation in the area of the incident.

Typical Map Requester
Planning Section Chief, Operations Section Chief

Target Audience
Fire Behavior Analyst, Long Term Fire Analyst, Strategic Operational Planner, Operations Section

Objective
The ***Vegetation Map*** shows the vegetation in the area of the fire perimeter. It may be used by Fire Behavior Analysts to help predict fire behavior and to develop suppression strategies. It may also be used to develop rehabilitation strategies.

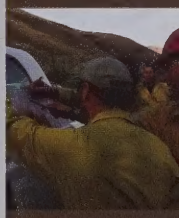
Guidelines
- Standard Incident Command System (ICS) symbology
- Color vegetation types (suggested colors: grasses = yellow; brush = orange; oak woodlands = blue-green or light green; conifers = green; alpine species = purple; barren = gray; water = blue)

Standard Elements

Cartographic
- Scale
- Title: Include Unit Identifier and Local Incident Identifier (e.g., ID-BOF-0095)
- Author
- North arrow
- Date of preparation
- Legend

Data
- Vegetation layer
- Current fire perimeter, ICS line features

Optional Elements
- Source statement: Include date that key features were collected; may be embedded in the legend or title box
- Graticule/grid & Datum: If appropriate
- Topographic base
- Shaded relief



Chapter 7

Purpose

This chapter provides procedures for sharing, backing up, and archiving GIS data developed on an incident. Data sharing ensures that all individuals involved with an incident have the information needed to do their jobs and that team transitions are effective and efficient. Data are backed up to ensure that the work of the GISS is not excessively impacted by computer failures or data corruption and to preserve the incident record. Data are archived to preserve the incident record while maintaining an efficient workflow in the GIS function of the Situation Unit.

Specifications

The primary datasets to be shared on a daily basis are the fire perimeter and the fireline features (e.g., Uncontrolled Fire Edge, Completed Dozer Line); however, necessary datasets may also include ICS data point features (e.g., Water Sources, Helispots), Management Action Points, Division Breaks, and any other dynamic data. The GISS posts these data in the incident's folder on the NIFC FTP site (*ftp://ftp.nifc.gov*) and the incident website (if one exists). The data on the NIFC FTP site are used by the Geospatial Multi-Agency Coordination (GeoMAC) Group (*http://www.geomac.gov*), an Internet-based mapping application and InciWeb (*http://www.inciweb.org*), an interagency website that provides the public with incident-related information.

Procedures

Data Sharing

With GSTOP, "data sharing" refers to the process of distributing data to other interested and authorized parties or agencies during the course of an incident. Three types of data sharing are typically required on incidents:

- Data uploads to the NIFC FTP site
- Incident data sharing with authorized users
- Transfer of data at team transitions

Unless otherwise specified, all incident vector data layers are exported to shapefiles to allow for compatibility of data among software versions and vendors. Some online systems (such as the Wildland Fire Decision Support System, or WFDSS) require data input in a zipped shapefile. Data sharing is subject to important restrictions on sensitive data, as described below.

Sharing data by uploads to the NIFC FTP site allows other data users and interested parties (e.g., host agency, cooperating agencies, IRINs, GACCs, regional command personnel) to access current incident information easily. A password is required to upload data to the FTP site. See the NIFC FTP help site (*http://ftpinfo.nifc.gov/help.html*) or the GSC website (*http://ftpinfo.nifc.gov/*) for directions on how to acquire a password and use the FTP site. *Never post any sensitive data on the NIFC FTP site, as data posted on this site are publicly accessible.*

By the end of each operational period, data layers containing the current fire perimeter and fireline features (e.g., Uncontrolled Fire Edge, Completed Dozer Line) should be uploaded (in shapefile format) to the incident's folder on the NIFC FTP site (*ftp://ftp.nifc.gov*). Tools in the GIS software and in the FIMT toolbar make exporting to a shapefile format very easy. A zipped copy of the geodatabase may also be uploaded to the FTP site. (Note the version number of the geodatabase in the zipped file name to ensure compatibility with different software versions.)

Data are occasionally shared directly (by USB drive, upload to GPS receivers, disk, or by email attachment) with other authorized users. The GISS should consult the SITL with any question about whether a request for data should be fulfilled.

Any incoming team will need a copy of the incident data and working files. Often this data sharing is accomplished by copying the incident's GIS subdirectory to an external hard drive, which the incoming team will keep. Good communication is needed between the outgoing GISS and the incoming and/or host agency GIS to ensure complete and useful incident data transfer. See Chapter 8, Team Transition, for complete procedures for team transition.

Sensitive Data: Sensitive data include but are not limited to cultural and archaeological resources, and/or sensitive, threatened, and endangered species and/or data subject to the Privacy Act (containing personally identifiable information). These data are usually obtained from the local agency and are returned to the agency at the end of the incident. Certain agencies may be more restrictive with sensitive data and even place extreme restrictions on their use. Adhere to agency requests while on the incident. A procedural document for the incident may be created in cooperation with the local unit and SITL to ensure the proper handling of sensitive data. Appendix D is an example of a data-tracking document used on an incident. Remove sensitive data from hardware that leaves the incident.

The GISS should check with the SITL about how to label sensitive data on incident map products; maps containing these data are for incident operational purposes only and must not be shared or posted to

public-facing FTP sites or websites. Appendix C is a map disclaimer that may be used on maps containing sensitive data. *Sensitive data are not retained with the incident archive.* Sensitive data should be flagged in some manner, to ensure that they are not shared or archived, or they should be kept in a specific folder, such as \base_data\SENSITIVE.

Some data (e.g., IR data) may be considered sensitive or "For Official Use Only" on incidents where homes and structures are threatened. It is imperative that the GISS communicate with the SITL and/or the PSC and Incident Commander to ensure that only approved information is posted. See additional considerations for protecting IR and other intermediate data under "Data Sharing with State or Local Entities," below.

Data Sharing with State or Local Entities: On certain incidents (nonfederal), the incident GIS data and maps may need to be shared with state or local Emergency Operations Centers (EOCs). EOCs focus on public safety activities, such as evacuations, shelter for displaced homeowners, and disaster declarations. Consequently, EOCs need maps and/or data on the current situation to coordinate emergency support functions. Needed information may include the location of the current affected area, the extent of damage within that area, or roadblocks and affected transportation routes.

EOCs may also need intermediate data, including IR data; use of password-protected files and/or approved email lists should be used to avoid the possibility of raw, unprocessed, or unapproved data being pulled from the FTP site and being posted on social media sites (such as Google Maps). Misinformation obtained in this way has been known to cause confusion and panic among the general public.

Data Backup and Archiving

GIS data are in a digital format that requires constant maintenance. Backing up and archiving the data is part of this maintenance. With GSTOP, "backing up" refers to the frequent saving of a short-term, separate copy of incident data for the purpose of recovery in the event of computer failure or data corruption. The term "archiving" refers to the process of moving data to a separate data storage device or media for long-term retention. Data archives consist of older data that are still important and necessary for future reference, as well as data that must be retained for regulatory compliance.

Data backups should be done daily, at a minimum, and should be stored on different hardware or media than the working GIS subdirectory. See "Guidelines for Data Backup" below. When a team transitions out, an archive copy of all the working data and files should be made and filed in the incident documentation held by the Documentation Unit Leader (DOCL) (see Chapter 3, Documentation and Metadata, and Chapter 8,

Team Transition). Archives are stored on a computer or media that is kept separate from the working GIS directory. As previously mentioned, *sensitive data must not be retained with the incident archive.*

If an incident continues through several team transitions, the GIS file structure may get unwieldy with older daily folders. In that case, an archive of the older folders and data can be made and filed with the DOCL; a copy may also be kept with backups in case it is needed for reference. Older folders and data can then be deleted from the working GIS subdirectories.

Guidelines for Data Sharing:

- If transitioning in behind another team, ask the outgoing GISS for the NIFC FTP password for the incident during transition.
- If needed, request a password for the NIFC FTP site as soon as possible after arrival.
- Consider referring requests for sensitive data back to the owner of the data.

Guidelines for Data Backups: (see also Chapter 2, File Naming and Directory Structure)

- Back up data in formats that allow for quick recovery: export incident data to shapefiles (exported shapefiles go in the \incident_data\exports folder) before making any backups, and also back up the geodatabase(s) (backups of the geodatabase go in the \incident_data\backups folder).
- At the end of each operational period, back up the \incident_data, \products, and \projects folders to a different location than the operational computers.
- Only dynamic datasets must be backed up daily; however, it is prudent to store one copy of all base data on media separate from operational systems.
- Document each backup and provide that information to the SITL for the Unit Log.
- More frequent backups can occur for datasets as the data change, if desired.
- Consider providing a copy of the GIS incident data backup to a CTSP or the DOCL for safekeeping.
- If backing up (or archiving) data to CD or DVD, consider using the ISO Level 2 or UDF 102 formats to accommodate long file names and directory paths (avoid using Joliet or ISO 9660 formats, as they are not compatible with long file names, i.e., file names will be truncated to the older MS-DOS 8.3 file name and therefore lose any metadata contained in the file name).

Guidelines for Data Archives: (see also Chapter 2, File Naming and Directory Structure)

- Archive all data necessary to recreate the incident; archive the contents of the \incident- data, \products, \projects and (nonsensitive) \base_data folders.
- Document each archive for inclusion in the Unit Log.

- The archived copy may be kept indefinitely or for a defined period of time; the archive retention period is usually set at 3 or 5 years and can be renewable.
- Archive data in formats that allow for quick recovery (e.g., shapefile); export incident data to shapefiles before any archive task.
- Archived data should also include datasets in the original format, so archive the geodatabase as well.

Responsibilities

The GISS posts updated data to the NIFC FTP site regularly, shares data with other interested parties in consultation with the SITL, protects incident information with regular backups and archiving, and ensures proper transition and use of data. The GISS and SITL must know which data layers are considered sensitive data and must adhere to restrictions on the distribution and handling of such data. The GISS communicates requests for information (e.g., data, maps) to the SITL to obtain the proper authorization to release the data to the requesting party.

Chapter 8

Purpose

This chapter provides an effective and consistent method of transitioning from one GISS to another to ensure that all related information, data, and products are transferred successfully.

Specifications

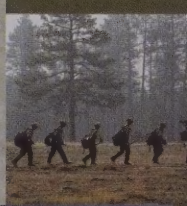
Transition encompasses the handoff of any hardware purchased for the incident's GISS and all relevant GIS data and media. It is important that all data are transferred to and remain in the current directory structure (see Chapter 2, File Naming and Directory Structure).

A transition document (narrative) is best initiated at the beginning of the assignment, as a way to track ongoing work. Not only will such a narrative help the next GISS assigned to the incident, but it can be of great value during the assignment when incident personnel need to locate maps created earlier in the incident. The SITL decides whether the narrative will be incorporated in an Incident Management Team transition document or whether it will be developed as a stand-alone document. As an alternative to this document, the SITL may direct the GISS to prepare a briefing of all the GIS activities on the incident. The choice between a document and a briefing may be based on incident complexity, size, and the need to answer questions about a deviation from standard operating procedures. (See Appendix E, GISS Transition Document Outline, for a guide to the elements of an effective transition document.)

Procedures

It is always important for the GISS to remain focused and follow procedures during the transition period. When transferring data from one storage device to another, it is critical that the GISS preserve the directory structure and drive letter mapping, or else follow Universal Naming Conventions (e.g., \\server\share\file_path).

A GISS uses a variety of media during an incident. Storage devices range from shared portable hard drives and basic shared drives on computers used by workgroups, to advanced computer networks using switches, hubs, DHCP, and snap servers. Several transition methods can be used (peer to peer, DVD, external hard drives). If the scope of the incident warrants, the Incident Management Team may purchase large-capacity external hard drives to store data and ease transition between personnel/teams. At incident close-out, the hard drive can be delivered to the local unit.



General Guidelines for Data Transfer:

- Document any unique characteristics of the data, along with the software (including version) and any tools being used.
- Check for any sensitive information and ascertain any guidelines that need to be satisfied for this information to be transitioned to the next team (e.g., the need to reformat contractors' hard drives and any other media that will be leaving the incident). Transferring any procedural documents about how sensitive data was used on the incident is important. Appendix D is an example of a data-tracking document used on an incident.
- Before saving all final products, turn off all software extensions so that the final GIS documents can be opened with the basic installation of the relevant GIS COTS software.
- Before data transfer begins, archive all incident data to removable media.

Documentation useful at transition includes:

- An image, hardcopy, and a list of each map type that has been produced on the incident
- A detailed narrative describing the status of equipment, workload, work schedule, and other activities
- A list of resources being used for mapping and data collection (IR, helicopter, field observers, local jurisdiction(s), other partner agencies, imagery sources)
- The skill sets of the individual GISS(s) remaining on the incident (to make better use of them with the incoming team and help with scheduling and availability)
- Map symbology information, including the authorized use of nonstandard symbols; the outgoing GISS must provide this information to the incoming GISS or the SITL during the transition briefings to facilitate consistency in the use of map symbols on an incident)

To ensure transition is complete, use the following checklist and document any limitations or concerns.

- Are there enough GISSs, and is workload appropriate?
- Are the incoming GISSs able to reproduce products produced by the exiting GISS(s)?
- Are there any outstanding requests from the local unit or other involved entities?
- Have the new GISSs established communication with the local jurisdiction(s) to share data (e.g., perimeter data)?

See Appendix E, GISS Transition Document Outline.

Responsibilities

In addition to preparing a transition document or briefing, the outgoing GISS must:

- Ensure that the incoming GISS(s) has/have a clean, usable, and documented copy of the incident data
- Review the Incident Management Team transition document with the incoming GISS(s), including the requirements for storing, sharing, and displaying sensitive data; review the detailed GISS transition document if it was not included in the Incident Management Team transition package
- Give the NIFC FTP site password to the incoming GISS(s) (Note: This password must not be included in the transition document)
- Request enough overlap between outgoing and incoming GISSs to allow for a smooth transition (generally, there should be at least a half of a shift overlap, and this should occur before items are due for the next Incident Action Plan)

The outgoing GISS and SITL must:

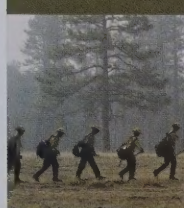
- Ensure that the GIS staffing and equipment requirements are planned for and will be met during the transition

The incoming GISS must:

- Test and verify that all data have been transferred successfully and are fully usable (access, read, and edit)
- Review the GISS transition document before the outgoing GISS demobilizes, and make sure its contents are clear (since contacting the outgoing GISS may be difficult after departure)

Communications

If any sections or units want maps related to their transition, those requests should go through the SITL. When available, a CTSP should be briefed on transitions in the GISS section to assist with the transition of the network, hardware, and software requirements of the GISS.



Common Geospatial Terminology

Archive: The long-term storage of data that are considered to be of value to the incident. Archived data are held independent of the continued existence of the file on the local disk. Files that have been archived may be removed from the local computer disk, if required (for example, for space reasons).

Attribute: Nonspatial information about a geographic feature in a GIS, usually stored in a table and linked to the feature by a unique identifier.

Backup: A copy process for securing current, active files that reside on the local disk and, by implication, are actively in use. Backups enable recovery of working files with minimal loss of data if data are lost or corrupted owing to power interruptions, hardware failure, software issues, accidental deletion, or other calamity.

Base Data: Data layers that exist before the incident and that are used to provide the base features for mapping (e.g., roads, land ownership, DRGs). These data are not edited during the incident.

Coordinates: A set of values represented by the letters x, y, and optionally z or m (measure), that define a position within a spatial reference. Coordinates are used to represent locations in space relative to other locations.

Coordinate System: A reference system consisting of a set of points, lines, and surfaces, and a set of rules, used to define the positions of points in space in either two or three dimensions.

Data Sharing: The process of distributing data to other interested and authorized parties or agencies during the course of an incident.

Datum: The reference specifications of a measurement system, usually a system of coordinate positions on a surface (a horizontal datum) or heights above or below a surface (a vertical datum).

Declination (magnetic): The horizontal angle between geographic north and magnetic north from the point of observation.

Digitize: To convert the shapes of geographic features from such media as paper maps or raster imagery into vector x, y coordinates.

Documentation: Tracking information about geospatial data using methods that are less than FGDC compliant. These may include "ReadMe" files (in .txt or .html format) or attribution of datasets describing the projection, methods of collection, contact information, and other information.

Esri: Environmental Systems Research Institute. Esri develops geographic information systems (e.g., ArcGIS). Synonymous with the acronym ESRI.

Feature: (1) an object in a landscape or on a map, or (2) a shape in a spatial data layer, such as a point, line, or polygon, that represents a geographic object.

File Geodatabase: A database or file structure used primarily to store, query, and manipulate spatial data (geometry, spatial reference system, attributes, and behavioral rules); stored as folders in a file system; each dataset is held as a file that can scale up to 1 TB in size.

Geodatabase: A database or file structure used primarily to store, query, and manipulate spatial data (geometry, spatial reference system, attributes, and behavioral rules).

Graticule: A network of longitude and latitude lines on a map or chart that relates points on a map to their true locations on the Earth.

Incident Command System Data: Primary information about the wildfire itself and features or locations directly pertinent to the management of the incident, including: the fire perimeter (area burned), firelines (e.g., Handline, Completed Dozer Line), and fire points (e.g., Drop Points, Helispots, Incident Command Post, Safety Zones).

Incident Data: Data that are created or edited in support of the incident; stored in the \incident_data folder of the GIS subdirectory.

Infrared Imagery: An image created by a device that detects infrared radiation and converts it into an electrical signal that is processed and stored digitally.

Latitude: The angular distance along a meridian north or south of the Equator, usually measured in degrees. Lines of latitude are also called parallels.

Local Incident Identifier (ID): A number or code that uniquely identifies an incident for a particular local fire management organization within a particular calendar year. (Often improperly referred to as "fire number.")

Longitude: The angular distance, expressed in degrees, minutes, and seconds, of a point of the Earth's surface east or west of a prime meridian (usually the Greenwich meridian). All lines of longitude are great circles that intersect the Equator and pass through the North and South Poles.

Map Scale: The ratio or relation between distance or area on a map and the corresponding distance or area on the ground.

Metadata: Information about data, such as content, source, vintage, accuracy, condition, projection, responsible party, contact phone number, method of collection, and other characteristics or descriptions.

Modified Base Data: Incident data consisting of base data layers that have been altered or edited in support of an incident.

Orthoimagery: A digital perspective aerial photograph from which distortions owing to camera tilt and ground relief have been removed. An orthophotograph has the same scale throughout and can be used as a map.

Personal Geodatabase: A database or file structure used primarily to store, query, and manipulate spatial data (geometry, spatial reference system, attributes, and behavioral rules). Datasets are stored within a Microsoft Access data file, which is limited in size to 2 GB.

Projection (map): A method by which the curved surface of the Earth is portrayed on a flat surface. This generally requires a systematic mathematical transformation of the Earth's graticule of lines of longitude and latitude onto a plane. Every map projection distorts distance, area, shape, direction, or some combination thereof.

Remote Sensing: The collection and interpretation of information about the environment and the surface of the Earth from a distance, primarily by sensing radiation that is naturally emitted or reflected by the Earth's surface or from the atmosphere, or by sensing signals transmitted from a satellite and reflected back to it. Examples of remote sensing methods include aerial photography, radar, and satellite imaging.

Server: A computer and storage device dedicated to storing files. Many users on a network can store files on a particular server.

Shaded Relief Image: A raster image that shows light and shadow on terrain from a given angle of the sun.

Shapefile: A vector file format for storing the location, shape, and attributes of geographic features. It is stored in a set of related files and contains one feature class.

Topography: The shape or configuration of the land, represented on a map by contour lines, hypsometric tints, and/or relief shading.

Unit Identifier (ID): A code used within the wildland fire community that uniquely identifies a particular government organizational unit (e.g., IDBOF = Boise National Forest located in the State of Idaho).

Universal Naming Convention (UNC): A naming convention used primarily to specify and map network drives in Microsoft Windows. UNC names consist of three parts—a server name, a share name, and an optional file path. These three elements are combined using backslashes as follows: \\server\share\file_path.

USB External Storage Drive: An external disk drive that is connected to a computer through a USB connection.

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Appendix A

Map Request Form

This is an example of a Map Request Form. It may be duplicated for use or modified to meet the needs of the incident.

Map Request Form

Date: ___/___/____

Desired Delivery Date and Time: ___/___/__ _____AM/PM

Requested by: _____

Deliver to: _____

Quantity: _____

Audience (circle): **Ops** **Public** **Planning** **Other**_____

Physical Map Properties

Format (circle): **Electronic** **Hardcopy**

If electronic, circle desired file format: **PDF** **JPEG** **Other**_____

Provide your email: _____

Size (circle): **8.5 X 11 in** **11 X 17 in** **17 X 22 in** **36 X 48 in** **Other**_____

Orientation (circle): **Landscape** **Portrait**

Map Design Properties

Color (circle): **Black-and-white** **Color**

Title:_____

Lat/Long Grid (circle): **Y** **N**

Layers (check all that apply):

- ☐ **Topography**
- ☐ **Hillshade**
- ☐ **Roads**
- ☐ **Ownership**
- ☐ **Rivers**
- ☐ **Cabins**
- ☐ **Allotments**
- ☐ **Fire Perimeter**
- ☐ **Mileposts**
- ☐ **ICS Symbols**
- ☐ **Towns**
- ☐ **Protection Zones**
- ☐ **Other** _____
- ☐ **Other**_____
- ☐ **Other**_____
- ☐ **Other**_____
- ☐ **Other**_____
- ☐ **Other**_____
- ☐ **Other**_____

Map Request Form (continued)

Map Request Form (continued)

Special Requests

_____

_____

_____

_____

_____

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_____

_____

_____

Appendix B

Sensitive Data Procedural Rules and Guidelines

1. Include information about responsibility for the security of the data in the "Delegation of Authority" to the Incident Commander, as well as how the data will be stored and returned to the agency representative at the close of the incident.[6]
2. Document the transfer and custody of the source GIS data media from the data owner or agency representative.
3. Do not copy the restricted data to the incident GIS data structure. Use the source data on the original media (read-only disk or external drive) in the map document to prepare map products.
4. Identify the Legend items on maps as *"Area of Interest"* or *"Special Consideration"* rather than the specific details about the feature.
5. Use clear and prominent disclaimer language on every map sheet:
   a. RESTRICTED: ONLY FOR USE BY: _____(person or position)
   b. Copy _____ of _____ (total number of maps produced)
   c. Return to _____ (data owner)
   d. CONFIDENTIAL DOCUMENT DO NOT DUPLICATE
   e. Map users are responsible for not compromising the integrity of the site(s)
6. Do not save PDF maps or map images in the standard GIS data structure or provide this information for incident documentation.
7. Do not post PDF maps or map images on an FTP site or website.
8. Delete any map files such as PDF or JPG files on local drives.
9. Maintain a separate, complete log of maps produced to document clearly the number of maps produced and the individuals responsible for the custody of those sheets and tracking of the products back to the data owner or agency representative.
10. Make a copy of the data custody log for incident documentation.
11. Make a copy of the completed restricted maps custody log for incident documentation.
12. Return the source data disk to the data owner or agency representative with the data custody log.
13. Return all restricted hardcopy maps to the local data owner or agency representative.

[6] See Wildland Fire and Aviation Program Management Operations Guide (Washington, DC: U.S. Department of the Interior, Bureau of Indian Affairs, 2013), chap. 17, "Reviews and Investigations," p. 17-11.

Appendix C

Sensitive Data Map Disclaimer

This is an example of a Sensitive Data Map Disclaimer. It may be duplicated for use or modified to meet the needs of the incident.

PROTECTED INFORMATION - NOT FOR PUBLIC RELEASE

This map contains information about historic and/or prehistoric cultural resources that may be withheld under section 304 of the National Historic Preservation Act of 1966, or under section 9 of the Archaeological Resources Protection Act of 1979. Do not copy or distribute this information. Abuse may result in fines and/or imprisonment.

Appendix D

Sensitive Information Map Custody Log

This is an example of a Sensitive Information Map Custody Log. It may be duplicated for use or modified to meet the needs of the incident.

Sensitive Information Map Custody Log

Incident Name: _____ **Unit ID & Local Incident ID:** _____

Map Name:	Sheet #	Total Sheet #	Date & Time	Person Responsible for Map	Signature	Returned Date & Time	Destroyed ☑
							☐
							☐
							☐
							☐
							☐
							☐
							☐
							☐
							☐
							☐
							☐
							☐

By signing I acknowledge that I will not copy, photograph, or distribute this map sheet.

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Appendix E

GISS Transition Document Outline

The GISS transition document should contain enough information for the incoming GISS to continue the work without needing to contact the previous GISS. The Incident Management Team may not want the fine details of a GISS transition document in the team transition package, but these details should be documented regardless and given to the incoming GISS. The following are suggested sections to include within the transition document.

- Daily Work Requirements and Time Schedule
- Data Structure (capture screen shots of directory in Windows Explorer)
  - folder-by-folder description of its contents
- Incident Specific Information
  - issues with data or software
  - other unique issues
- Data
  - sensitive data handling
  - daily data needs
- Websites Used
  - info on FTP site
  - GIS services (e.g., Web Map Service, ArcGIS)
  - servers
  - other important websites
- Software
  - versions
  - software added on incident
- Printing
  - available printers/plotters
    - location of printer drivers
    - IP address /network settings
  - document settings
  - workload
    - GIS products
    - non-GIS products
  - networked printer addresses
  - supply sources

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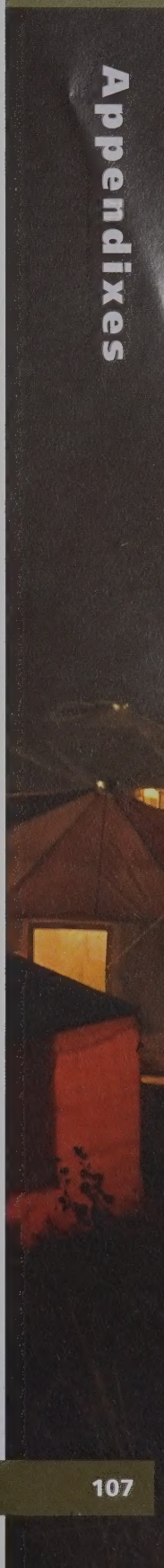
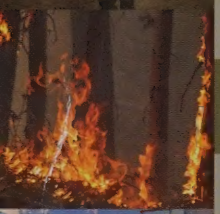
P.O. Box 25047
Denver CO 80225

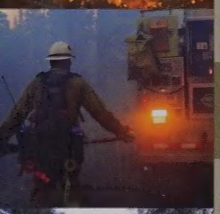


Introductory Information

GISS Minimum Expectations



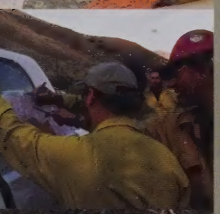
File Naming and Directory Structure



Documentation and Metadata

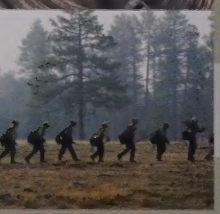
Minimum Essential Datasets

Map Symbology



Map Products

Data Sharing, Backup, and Archiving



Team Transition

Common Geospatial Terminology

Bibliography

Appendixes

Instructions for Quick Access to Chapters

All chapter titles are listed here on the back cover. Next to each is a unique photo. The same photo appears throughout that chapter in the sidebars of pages, at approximately the same position on the page. You can find a chapter quickly by identifying the unique photo for that chapter and then flipping through the text to locate pages with the same photo.